

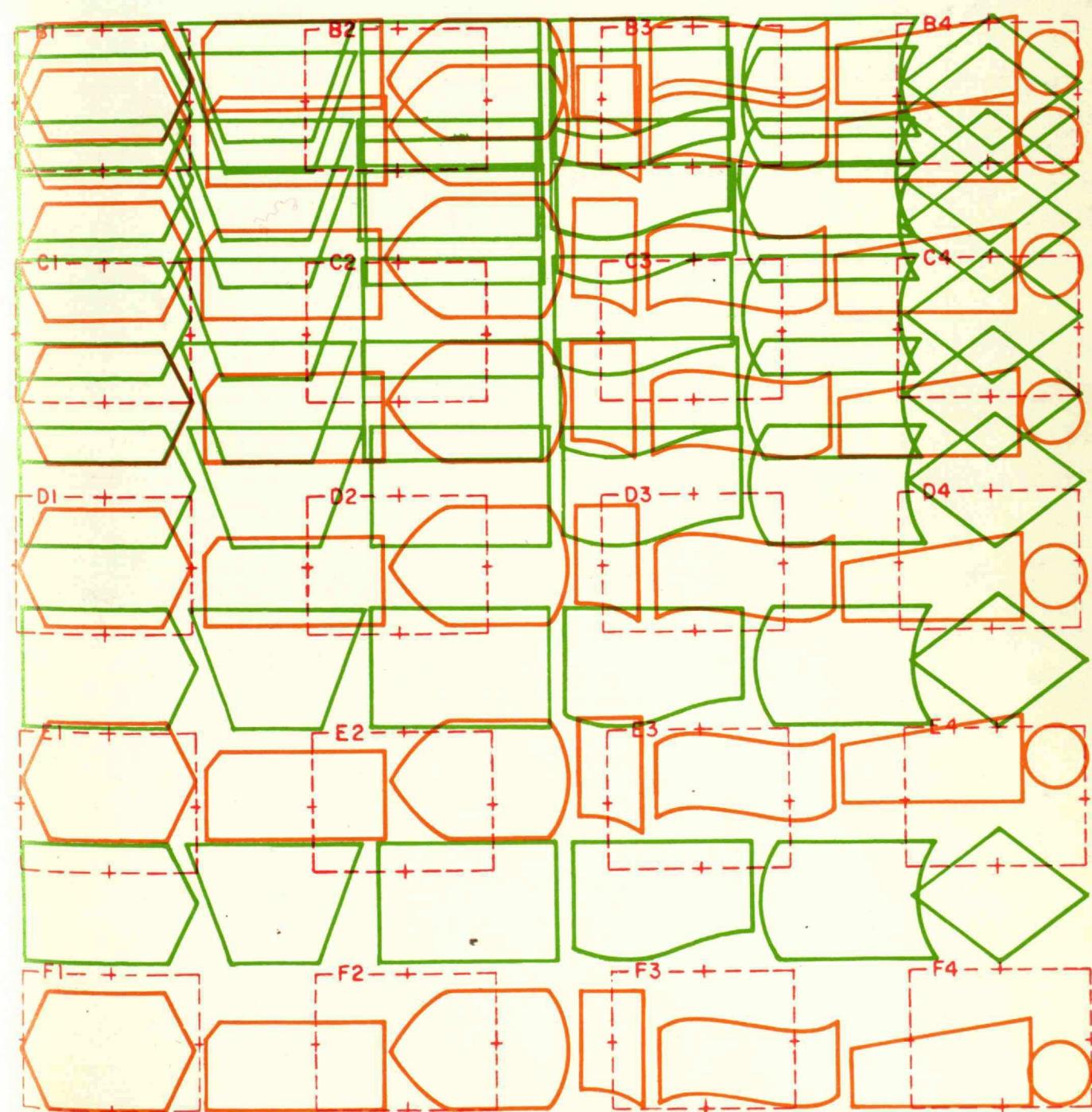
Technology Review

Edited at the Massachusetts Institute of Technology

May, 1967

Recent Advances in
Holography, *page 16*

Mental Effects of
Malnutrition, *page 23*



technology review

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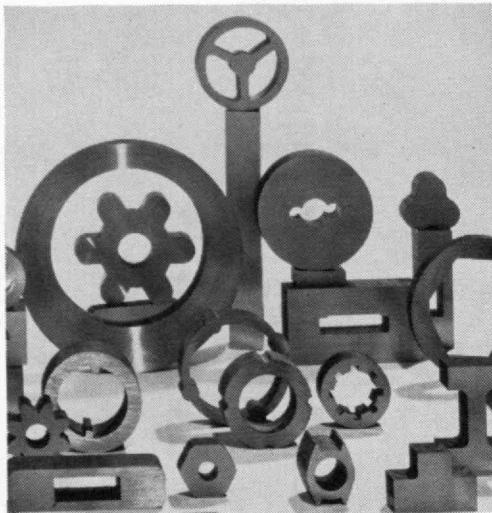
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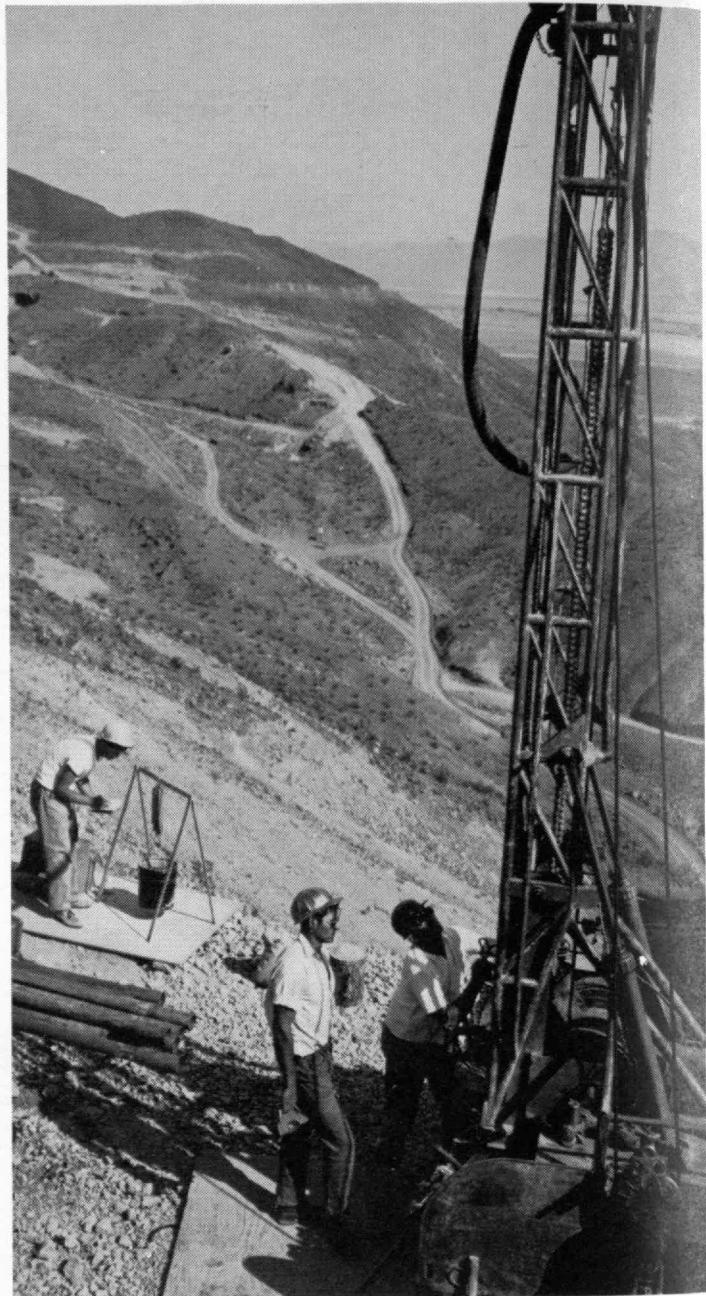
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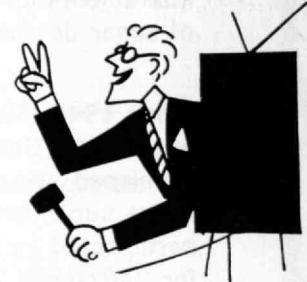
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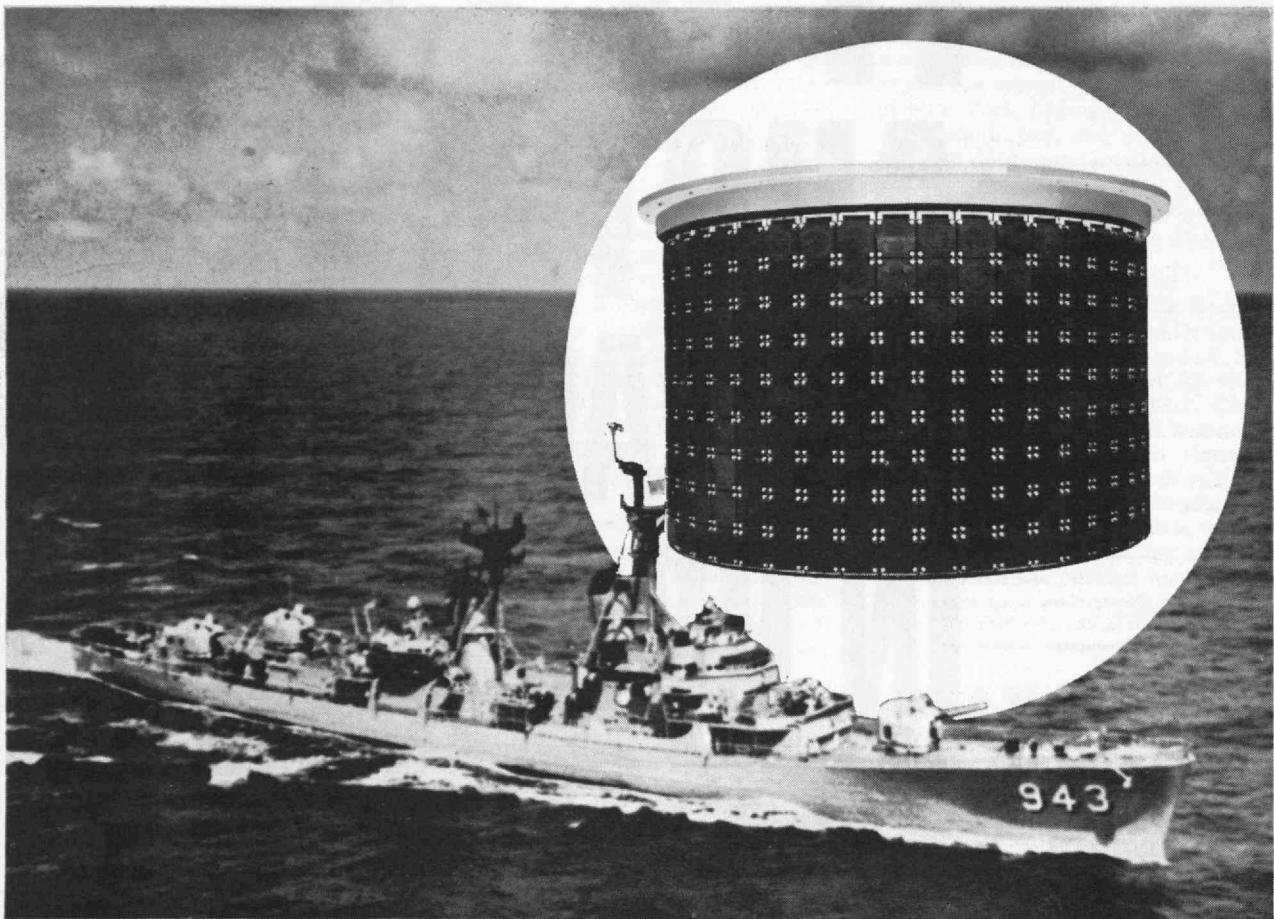
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Cover design and illustration for "Computers and Management
Automation" by Barbara Hawley; illustrations for
"Recent Advances in Holography" by Dietmar Winkler, M.I.T.
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Next month: Two articles on the technological aspects of maintaining
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Also reviews on current knowledge of the planet Mars and the continuing
progress of cancer research.

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Challenging Hunger

By Robert C. Cowen, '49

The National Council on Marine Resources and Engineering Development has given both Congress and the White House a sharp challenge. It suggests that the United States provide world leadership in developing the protein resources of the sea to give undernourished peoples a balanced diet.

This is one of nine areas of ocean development that the cabinet-level council recently listed as worthy of special emphasis in the American oceanographic program. The other eight, which include such fields as deep-ocean technology, all represent demanding technological problems. But none of them has the kind of put-up-or-shut-up challenge that is implicit in the proposal to help needy nations win more food from the sea.

As reported here last month, many of the world's people are losing the race with hunger. Filling their food baskets calls for unprecedented efforts both to check runaway population and to invigorate sluggish economies. It will take decades to do this even with massive foreign aid which, so far, has not been forthcoming.

But there is one immediate food need that can be met fairly quickly and probably be met in full. That is the need for protein. In urging the United States to take the lead in meeting this need, the council is proposing action toward a realistic international goal.

In further suggesting that the United States set itself the national goal of helping at least one protein-short country gain the fishing industry to fill its protein requirements, the council is throwing down the gauntlet. It is asking its country to do something practical about talk of the need to help the hungry and of the need to develop the resources of the sea.

Protein Supply and Demand

A few admittedly rough calculations illustrate what is involved. In 1964, the U. S. Department of Agriculture forecast the world protein deficit then expected for 1970. It foresaw a shortage of animal protein equivalent to 6,525 thousand tons of nonfat dry milk. In terms of fish, that's the same as 3,012 thousand tons of protein concentrate. This is extracted from fish meal which is made by grinding up whole fish.

The USDA also anticipated a shortage of plant protein equal to 6,714 thousand tons of dry beans. The significant difference between the two types of protein lies in this. You can

live on dry milk or fish protein concentrate as far as your protein needs go. But the plant proteins lack some of the essential amino acids.

Noting the USDA forecast, Wilbert McLeod Chapman, Director of the Division of Resources of the Van Camp Sea Food Company, has estimated that seven million tons of fish protein concentrate would meet the total anticipated 1970 deficit of both plant and animal proteins. The production of that much protein concentrate would also yield about a million tons of edible oil. This would help meet the world fat deficit of 3,101 thousand tons also forecast by USDA for 1970.

It would take about 45 million metric tons of fish a year to make that much fish protein concentrate. The 1964 world catch of marine fish was just over 40 million tons, to cite the latest statistics in my file. Since then, the world catch has risen slightly. Thus roughly doubling the present fish catch could fill the expected protein gap.

Toward More Efficient Fisheries

This is not as enormous a jump as it may seem. World fish production has been doubling every 10 years since World War II as it is, and recently the increase has been three times faster than the world's population. If the effort were made to increase significantly the fish production of the protein-short countries, a doubling of the world's catch primarily for their benefit is a challenging but reasonable goal. This could not be done by 1970, however.

To do it at all calls for progress along four major lines. The needy countries have to have modern fishing fleets. They need effective processing methods to turn the catch into a cheap, nonperishable product that their people will eat. New fishing grounds need to be found in their waters. And, what may be most important, local restrictions that impede development of modern fishing industries need to be removed. The first three areas of effort call for substantial foreign aid. The last area, that of removing self-made restrictions, is one in which the developing countries must help themselves. If they do not, all the foreign aid the world can provide won't do much good.

The restrictions take different forms in each country. They may be imbedded in a local tax structure that penalizes fish production. They may be based on a mistaken concept of conservation, as in the case of Peru to be discussed in a moment. One of the commonest types of regulation discourages use of modern boats and their gear to protect fishermen using antique vessels and traditional methods. Whatever their nature, Dr. Chapman says such restrictions are one of the biggest single roadblocks to progress.

Peru long banned the reduction of anchovies to meal and oil because it wanted to protect the food supply of the guanay birds. These fish-eating sea birds roost on offshore islands. Their vast deposits of droppings (guano) provide cheap, high-grade fertilizer for Peruvian farmers. Then the restriction was relaxed. Peruvian fish production shot up from 196 thousand tons in 1954 to 9,130 thousand tons in 1964 to make the country one of the leading fishing nations of the world. The guanay birds continue to prosper.

Peru is exploiting one of the world's richest fisheries. It is associated with the Humboldt Current. The current flow tends to bring water up from below, water which is rich in nitrates and phosphates. These minerals are released by decay of settling organic matter. They stimulate growth of tiny plants and animals that form the base of a food pyramid supporting an abundance of life. Protein-short nations need similar areas relatively near at hand. To judge from sketchy research, they probably have them.

The Benguela Current flowing up the African west coast appears to have some potentially rich fisheries associated with it. Parts of the Indian Ocean also seem promising. In fact, the northern two-thirds of that ocean now are thought capable of yielding at least 10 times their present annual production of two million metric tons of fish.

What is needed now is specific, intensive research to define such fish resources clearly. Recognizing this, the U.N. Food and Agricultural Organization last February called for a world assessment of fish resources. Certainly, such specific research will be an essential part of any fisheries aid program.

The need for a cheap, nonperishable product probably is best met by fish meal or protein concentrate made from it. Ways of producing these in forms fit for human consumption have been worked out in several countries. They now need to be developed for efficient mass production.

In outlining this general picture, I don't want to leave the impression that the expected 1970 protein deficit is likely to be made up in any substantial degree: 1970 is too close for that, and the problems are large. The point of comparing the USDA forecast with sea food resources is to show that meeting the world's protein hunger is feasible in terms of what the sea provides and what men can take from it. It is reasonable, however, to think that fish protein production could be boosted fast enough in needy countries for them to meet their growing protein needs by the mid-1970's. The main thing needed is vigorous effort along fairly well-defined lines. This is why the challenge thrown down by the council is so sharp.

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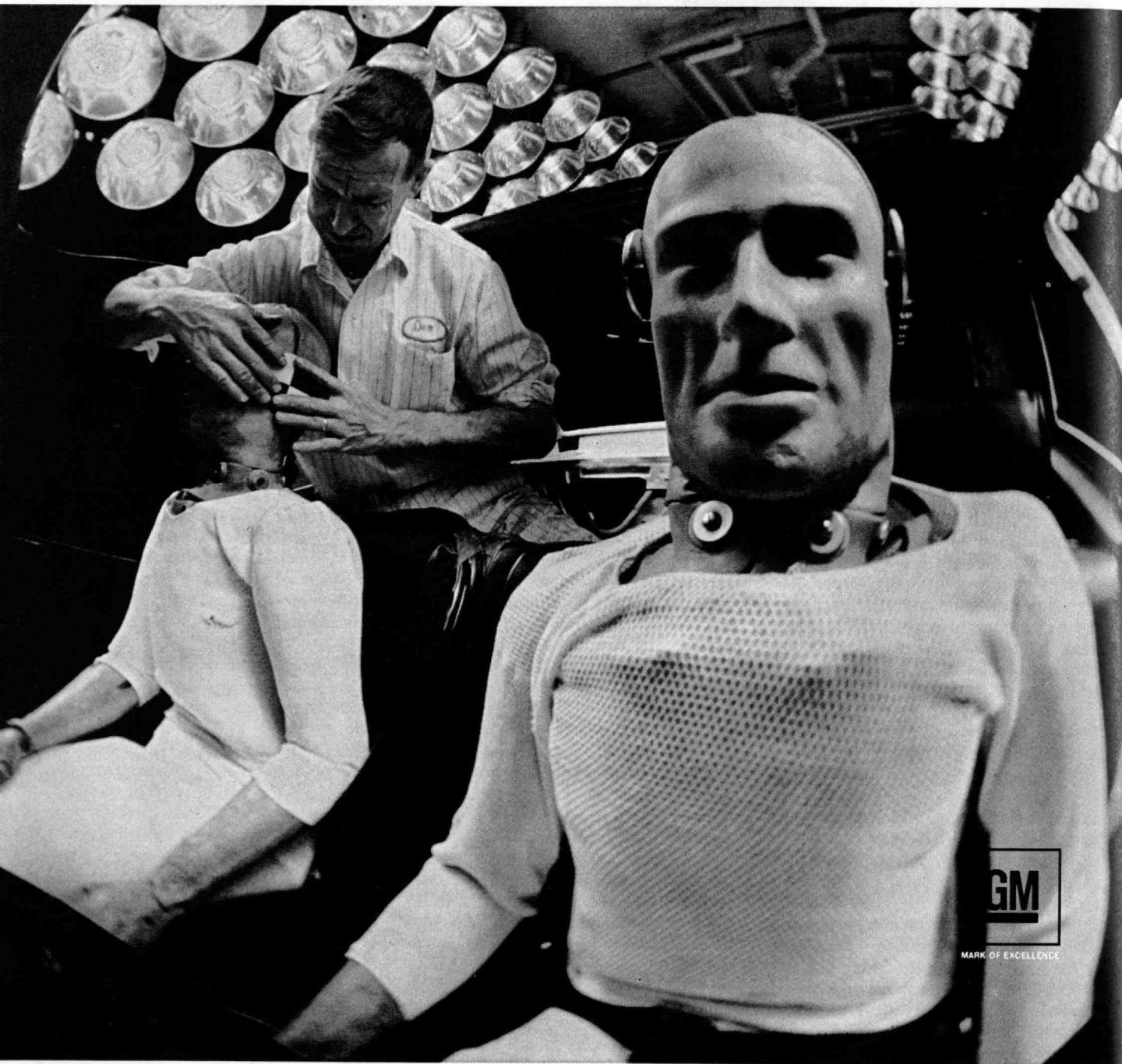
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Review on Books

Bohr, Atom, and World

By Joseph Mindel

At intervals in the history of civilization, there occur concentrations of genius that appear to violate the statistical laws of genetics and leave us—who live in later, less favored times—lost in wonder and in awe. Socrates, Alcibiades, Pericles, and Thucydides might all have attended the performance of a play by Euripides, with Sophocles, an old man, and Aristophanes, a boy, in the audience, while the author looked on backstage. Two thousand years later, Leonardo da Vinci, Raphael, and Michelangelo competed for commissions, among a throng of such lesser contemporaries as Titian, Botticelli, and della Francesca.

It is a plausible hypothesis that each golden age centers around one major manifestation of the human spirit. If the genius of Periclean Athens lay in philosophy and the drama (which were not so far apart then as now) and Renaissance Italy expressed itself primarily in art, then the Twentieth Century is unique in the achievements of its scientists. The assemblage of scientific notables at the Fifth Solvay Conference in 1927 is as awe-inspiring as any earlier roster of painters, poets, and philosophers. The participants included Bohr, Born, Bragg, Brillouin, de Broglie, Compton, Debye, Dirac, Ehrenfest, Einstein, Heisenberg, Lorentz, Planck, and Schroedinger. And foremost among these was Niels Bohr.

Rugh Moore's *Niels Bohr* (Knopf, New York, 1966, 436 pp., \$6.95), a full-length biography, is appropriately subtitled "The Man, His Science and the World They Changed." The events of Bohr's life and the development of his scientific thought are described in the framework of events in the world at large, as well as in the scientific world in which he moved. Miss Moore is a talented science writer. Without any mathematics, she provides a lucid, readable, and accurate history of the concepts of atomic structure from the earliest Bohr atom to nuclear fission and the atomic bomb.

The basis of the quantum theory was established in Bohr's paper of 1913, in which he combined Planck's idea of the quantization of energy with Rutherford's nuclear model of the atom. For almost 50 years, until his death in 1962, there was hardly a facet of quantum mechanics in which he was not concerned.

Miss Moore treats the disagreement between Bohr and Einstein at length and with appreciation of the impor-

tance of its implications. Einstein could not accept the statistical nature of quantum mechanics. "God does not play dice," he said. In confrontations at several conferences, he devised imaginary experiments designed to outwit the Heisenberg principle of uncertainty and restore unequivocal causality. In every case, Bohr was able to show a flaw in the reasoning, without, however, convincing Einstein, who wrote, "I look upon quantum mechanics with admiration and suspicion."

There was a quality of tranquility in Bohr's life. The bare statement needs qualification. He knew personal tragedy: one of his five sons was drowned in a boating mishap; he shared in the universal tragedy of two world wars and a Europe dominated by Nazism; he helped initiate the atomic bomb project, worked on developing the bomb, foresaw the problems it would create, and failed to convince Roosevelt and Churchill (the latter even thought he might be a security risk) of the need for co-operation with the Russians.

On the whole, however, there was an absence of struggle, an almost inevitable progress from year to year. He did not have to defend his doctoral thesis, since all the professors who spoke praised it. His 1913 paper created a revolution in physics—bloodless and practically unopposed. In 1920, at the age of 35, he had his own institute, and two years later, the Nobel prize. Denmark invited him to live in "The House of Honor," the semiofficial residence for her greatest citizen. He was loved and honored by his family, his friends and his colleagues. He was, in George Gamow's phrase, "a great and lovable figure."

The Story of Quantum Theory

Professor Gamow has written a history of quantum theory, *Thirty Years That Shook Physics* (Doubleday, New York, 1966, 224 pp., \$5.95), that is both more personal than Miss Moore's account, and more technical, though hardly more mathematical. He spent several years as a student at Bohr's institute, where he met many of the scientists involved in the early development of quantum mechanics.

The 30-year period of the title begins in 1900 with Planck's quanta and ends with Dirac's relativistic wave equation (the paper was actually published in 1929), when "Quantum theory took the final shape with which we are now familiar." Those who have read Professor Gamow's other books will recognize, and others will be pleased to discover, the clarity of his discussion of such topics as Pauli's exclusion principle, Heisenberg's uncertainty principle, matter-waves, and anti-particles. The charm and humor of his stories about scientists as people

are also evident in his sketches and line drawings, as well as in the many photographs he has included. Most of these are snapshots with irreverent captions.

The last quarter of the book is the script of a play written and performed by students of Bohr in 1932. It is in the form of a parody of Faust, with private (well, maybe semiprivate) jokes about Ehrenfest, Pauli, and the neutrino that were undoubtedly funnier in 1932 than 35 years later. Even this, however, tells something about scientists as people.

Quantum Theory in Detail

Quantum Mechanics for Science and Engineering (Prentice-Hall, Englewood Cliffs, N.J., 1967, 115 pp., \$5.50) by Herbert A. Pohl is intended "to sketch for undergraduate students the basic ideas of quantum theory." The author, professor of physics at Oklahoma State University, gives a concise treatment of the origin of quantum theory, the principles of wave mechanics, and the application of the wave equation to the hydrogen atom, many-electron atoms, molecules, and many electron systems. The last chapter deals with the molecular orbital approach and the valence bond approach to the explanation of solid state phenomena.

The book should provide a conscientious reader with a basis, not for using the techniques of quantum theory, but for understanding how they are used.

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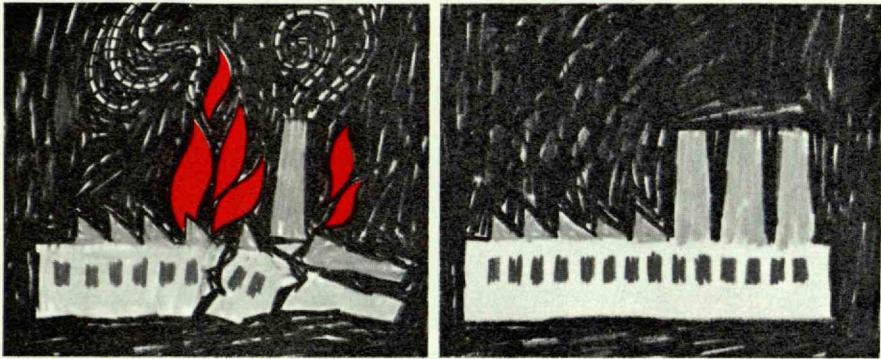
Anthony D. Kurtz, 1951

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Review on Education

C.I.A.: Repair the Damage

By Corbin Gwaltney

Officially, at least, the President of the United States has closed the book on the story of undercover aid which federal agencies, principally the CIA, have given to such private organizations as the National Student Association. Several weeks ago, Mr. Johnson accepted the key recommendation of a special panel he had appointed to look into the whole matter, following the disclosure that the CIA had been giving money, clandestinely, to finance the student association's participation in international activities. It said:

"No federal agency shall provide any covert financial assistance or support, direct or indirect, to any of the nation's educational or private voluntary organizations."

But, for hundreds of students, faculty members, and institutions of higher education in this country, the incident may be far from closed. They expect that the activities they carry on in other countries may be shadowed for years to come with the suspicion that what is ostensibly a private, scholarly enterprise may actually be a United States government-financed activity with overtones of propaganda and even espionage.

A Statement of Concern

By coincidence, on the same day on which the White House released the recommendations of the President's investigative panel, a little-known but influential private organization called "Education and World Affairs" issued a statement on much the same subject. Education and World Affairs is a five-year-old nonprofit organization established with Ford Foundation and Carnegie Corporation money. Its purpose is to study and make recommendations about the international activities of American colleges and universities—so when, even before this year's sensations about CIA support of the National Student Association, EWA began to worry about the lack of candor with which many of U.S. higher education's overseas activities were conducted, it was reasonable to suppose that the organization had strong evidence that there was, in truth, something to worry about.

Had it not been for the CIA revelations, however, EWA's concerns might have stirred little interest outside of the offices of university officials directly involved in higher education's foreign enterprises. But in the afterswell from

those revelations, the EWA recommendations as to how colleges and universities should conduct themselves on the international scene take on an especially forceful, and obviously relevant, character. Even the firm statement from the White House, forbidding covert government-education relationships in the future, does not lessen the relevance, and the importance, of EWA's pronouncement.

EWA sets forth seven "guidelines for action" which it hopes America's institutions of higher learning—and their faculty members and the public, as well—will consider carefully. Here are excerpts:

- "The universities must assume an active and effective role in providing safeguards and setting high standards for U.S. study and research undertakings overseas. This requires, above all, throughout the faculty a heightened sense of personal responsibility and professional integrity in all such undertakings.
- "The university must take the lead in insisting on the rule of candor and full disclosure in connection with all overseas research. This means that the scholar, while maintaining his university affiliation, must not take on any project or assignment which would not permit full disclosure of purposes, methods, sponsorship, and financing to his colleagues, students, superiors, and others who might properly inquire.
- "The university should reject covert funding of overseas research and at the same time press for an enlargement in the grant-making capacity of those government agencies which are not part of the military and intelligence complexes. It should seek to assure that faculty members applying for funds are aware of the full range of possibilities, public and private . . . The individual scholar should . . . be particularly scrupulous about making full disclosure of the origins of his funds if there are factors involved which, at some later time, might compromise his work or embarrass other scholars.
- "The university should use all available means to assure that suitable academic quality standards are met with respect to overseas research projects and the scholars who will carry them out. . . . Such review should take into account the origins of the funds and any other aspect of sponsorship which might interfere with the successful pursuit of work abroad.

- "The university should seek to assure that the overseas research of its faculty members enhances the American academic presence abroad and projects the best qualities of our educational community. It can do so partly by encouraging its scholars who are going abroad to take active account of

the other country's developmental needs in education and research. . . .

The individual scholar today must show a broadened awareness of the total setting in which he is operating. He must be especially sensitive to the possibility that his own actions can have damaging consequences for other scholars in the future, even if he is so fortunate as to escape their effect.

- "The university should lend its support to the strengthening of our educational representation abroad as a basis for more effective cooperation with the academic communities of other countries. . . .

- "Through its graduate faculties and professional schools, the university should begin to build into the training of students an appreciation of the types of problems that are involved in overseas research. . . ."

In conclusion, the EWA report says: "[Our universities] must exert their leadership to bring the conduct of research carried out by U.S. academics in other countries up to the highest standards."

The recommendations submitted to President Johnson by his investigating committee are consistent with the ideas in this report. And they reflect the same basic concerns.

"The work of private American organizations, in a host of fields, has been of great benefit to scores of countries," the President's committee wrote. "That benefit must not be impaired by foreign doubts about the independence of these organizations. The committee believes it is essential for the United States to underscore that independence immediately and decisively."

But if the federal government's support of the overseas work of scholars and other private persons and groups were to be withdrawn entirely, who would pay the costs of such activities? The problem is a real one; the lack of private support is what appears to have driven the National Student Association, for instance, to accept CIA financing in the first place.

The President's committee had a clear answer:

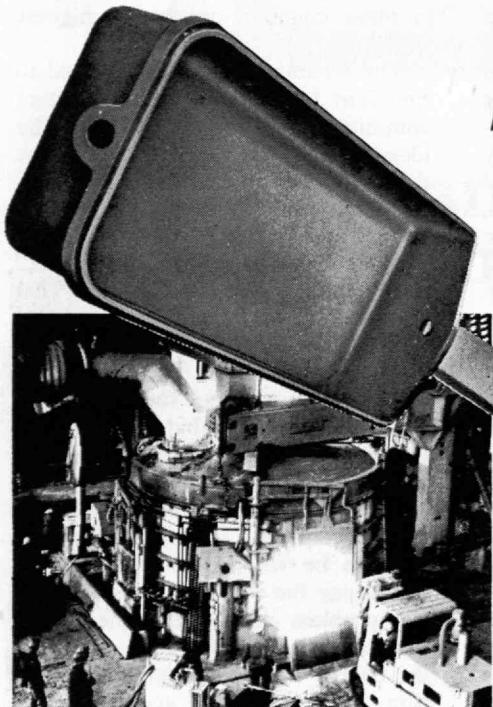
"The time has surely come for the government to help support such activity in a mature, open manner. . . .

"The committee therefore recommends that the government should promptly develop and establish a public-private mechanism to provide public funds openly for overseas activities of organizations which are adjudged deserving, in the national interest, of public support."

If such a mechanism can be developed quickly—and financed adequately—it is possible that the damage to American educational and research efforts abroad may be reparable.

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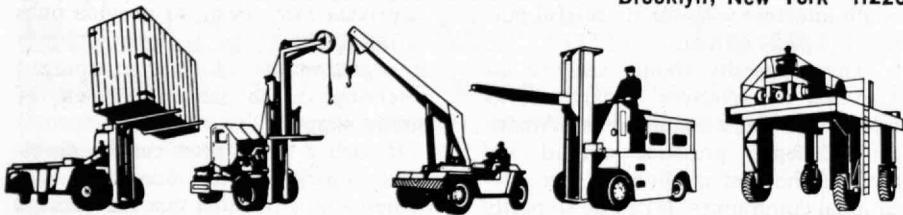
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Puzzle Corner

By Allan J. Gottlieb, '67
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Hi. With the pressure of grad school acceptance finally off my shoulders, I can start to sleep at night and even smile once or twice during the day. Adding to my happiness is the wonderful response you are giving my column. I am afraid that the problems for this issue may be of lower quality since several of them are mine.

Problems

68—The first puzzle was submitted by Stuart P. Keeler, '57.

I would like to give you the following puzzle for your "math experts" to work on. I think they will have lots of fun trying to tackle this one. It is my favorite. By the way, my undergraduate degree at M.I.T. was in Course IX—General Engineering.

Insert the remaining digits 7, 8, and 9 into the proper place in the following sequence:

—, 5, 4, —, 1, —, 6, 3, 2, 0.

69—Arrange 21 points so that they form 12 lines each having precisely 5 points.

I have been asked to include an occasional mathematical problem so here is one from my midterm exam in graduate algebraic topology.

70—Find a relation among the betti numbers of the homology of a compact orientable non-bounded n-dimensional manifold. Do the same for the corresponding torsion subgroups. A hint was given: compute many "simple examples." Proofs were *not* required.

71—Thomas F. Hickerson, '09, would like to know the minimum integral values of A, B, and C such that $A(A + 8) = B(B + 28) = C(C + 34)$.

72—Arthur Mohan, '08, sent in the following problem:

In how many ways may "m" different blue books and "n" different red books be arranged on a shelf so that no two of the red books are together? What inequality must "m" and "n" satisfy? This is supposed to be solved without the use of any theory of groups or sets.

73—Show that if $2^p - 1$ is a prime then $2^{p-1}(2^p - 1)$ is perfect.

Speed Department

The only entry for this month comes from Arthur D. Delagrange, '61, who asks:

74—Why does Technology Review always arrive the night before a quiz?

Solutions

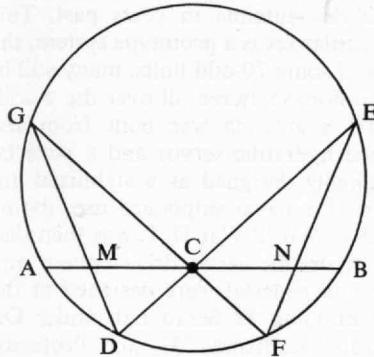
28♦—1 is the smallest integer that is a perfect cube, a perfect 4th power, and a perfect 5th power. What is the next small-

est integer with this property? Any number raised to the 60th power has the property, but surely there is some number smaller than 2^{60} .

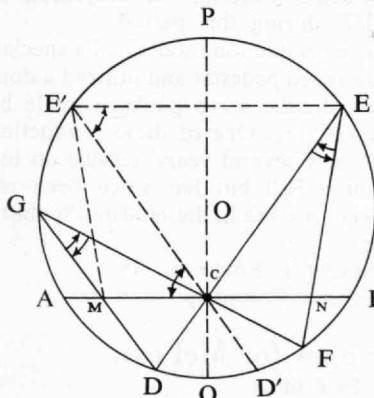
E. Alan Phillips, '57, has shown that the smallest such integer must be 2^{60} . This number must be factorable in the form $P_1^{n_1} P_2^{n_2} P_3^{n_3} \dots$, and hence n_1, n_2, n_3, \dots must each be divisible by 3, 4, and 5—that is, if nonzero they must be divisible by 60. Therefore 2^{60} is the answer.

Also solved by Douglas J. Hoyleman, '64, John L. Joseph, '40, and William P. Bengen, '69.

29♦—Given a circle, Q, with a chord AB and C its midpoint. Through C draw any two chords DE and FG. Form DG and FE intersecting AB at M and N respectively. Prove MC = NC.



Mark H. Yu, '70, my analytic geometry expert, came through again. Mr. Joseph gave a more geometrical argument which I shall use.



Label center O. Extend diameter OC to P and Q. Draw $EE' \perp$ to PQ. Extend $E'G$ to D'. Join GE.

$$\text{Angle } E'GM = \frac{1}{2} \text{ arc } E'PEFD = 180^\circ + E'P + QD$$

$$\text{Angle } E'CM = \angle E'E'M \text{ since } EE' \parallel AB$$

$$\text{Angle } E'CM = \frac{1}{2} \text{ arc } EBFD' =$$

$$180^\circ - PE - DQ$$

$$\text{since } E'P = PE \text{ and } D'Q = QD$$

$$\text{Angles } E'GM + E'CM = 180^\circ$$

\therefore points E', C, M and G are inscribable in a circle and

\therefore Angle $ME'C =$ angles $MGC + CEN$

Compare $\triangle ME'C$ with $\triangle NEC$

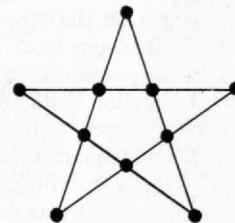
Angle $ME'C =$ angle NEC ; $E'C = EC$;

Angle $E'CM =$ angle ECN

\therefore they are congruent.

30—Arrange 10 dots on a piece of paper ("10 points in $[0,1] \times [0,1]$ " for you math types—ed.) in such a way that five line segments can be drawn through the dots, and each line segment contains exactly four dots. No two line segments can be colinear.

This was so easy that the following solution was submitted by Allan J. Gottlieb, '67. When he solves them they really must be trivial.



Also solved by Douglas Hoyleman, John W. McNear, '59, Alan S. Ratner, '69, Peter L. Eirich, '69, A. Ostapenko, Richard D. Minnich, '65, Steven L. Oreck, '70, Larry Horton, Erich S. Kranz, '70, John Joseph, and Mark Yu, who found two slightly different but exceedingly ugly shapes.

31—Let C be the set of those reals whose base 3 expansions have no 1's. Can every real be expressed as a finite sum of elements of C?

This one really caused a stir. Two people claimed that the answer is no because they only considered whole numbers. Mr. Phillips sent in a proof valid only for the rationals. Douglas Hoyleman, who has already won a free subscription, sent in the following:

Okay, here it is, the first correct answer:
Yes.

Seriously, I think I can show this using the fact that the Cantor set is closed and things like that, but I don't want to hog all the free subscriptions. If you desperately need a solution I'll send you mine.

This time, however, I am not desperate and must award two new prizes.

The "M.I.T. Freshman" strikes again! A little thought yields an answer in under 15 minutes to problem 31.

It is obvious that every C-number can be expressed in the form:

$$C = \sum_{i=-\infty}^{\infty} C_i 3^i \quad (C_i = 0 \text{ or } 2)$$

Define the class of K-numbers by

$$\{K\} = \left\{ \frac{C}{2} \right\}$$

Each K-number will be of the form

$$K = \sum_{i=-\infty}^{\infty} k_i 3^i \quad (k_i = 0 \text{ or } 1)$$

It is apparent that every real can be expressed as the sum of two K-numbers. Therefore, given a real to be expressed by $C_1 + C_2$, define K_1 and K_2 such that

$$K_1 + K_2 = (C_1/2) + (C_2/2) = R/2$$

Multiplying the above by 2, we obtain $C_1 + C_2 + R$. Q.E.D.

—Paul Huggett, '70, East Campus

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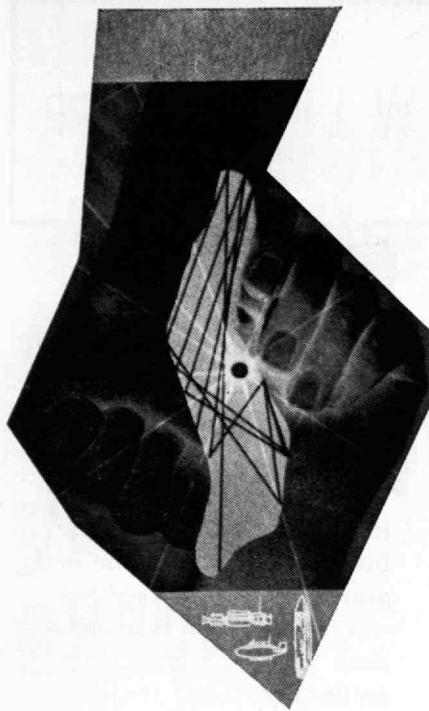
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Letters on Review

Compliments of a Retired Editor

To the Editor:

Please accept the compliments of a retired editor—after 50 years—on the railroad stories in your February issue. My memory goes back to 1885 and is of watching trains on the New Haven road which adjoined our back fence. I decided to be an engineer.

Another connection with railroads has to do with street railways. My grandfather, John Stephenson, invented and built the street car, which he built in New York in 1832. It was drawn by a team of horses—two teams on the Third Avenue Hill.

He also built some steam railroad coaches. During the Civil War he built gun carriages.

I gave his original patent to the Library of the City of New York.

J. NEWELL STEPHENSON, '09
Wolfeboro, N.H.

Santaladiego

To the Editor:

It should not be necessary to point out to Mr. Cowen (page 5, Technology Review for February) that it is *Santaladiego*, but you know how provincial

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WILLIAM M. BROBECK, '33
Orinda, Calif.

Weather Radar

To the Editor:

In the February issue of Technology Review an article titled "Tallest Tree in Cambridge" mentioned a CPS-9 antenna.

Since this system was developed by Raytheon Company for the Signal Corps (U.S. Army), I thought a brief history might be in order.

It is not as stated "converted from an army tracking radar to a weather radar" but was specifically developed to meet specifications as directed by the Signal Corps for a true weather radar. I personally have seen and serviced this antenna in years past. This particular set is a prototype system, the first of some 70-odd units, many still in operation, scattered all over the world. M.I.T.'s antenna was built from salvaged hydraulic servos and a pedestal originally designed as a stabilized antenna for naval shipboard use, dating back to World War II. It was then that the hydraulic servo drive system and antenna pedestal were designed at the old Building 32 Servo Lab under Dr. Gordon S. Brown, '31, and Professor Jay W. Forrester, '45. Leonard C. Dozier, '46, Robert R. Everett, '43, and Stephen H. Dodd, '42, all of M.I.T., were part of the design team. I was a technician working for Raytheon at M.I.T. during this period.

The production model had a specially designed pedestal and utilized a double hydraulic servo package made by Vickers, Inc. One of these production units saw several years' service on top of Blue Hill but has since been removed to a site in the Hudson-Sudbury area.

VINCENT J. FOPIANO, '35
Raytheon Company

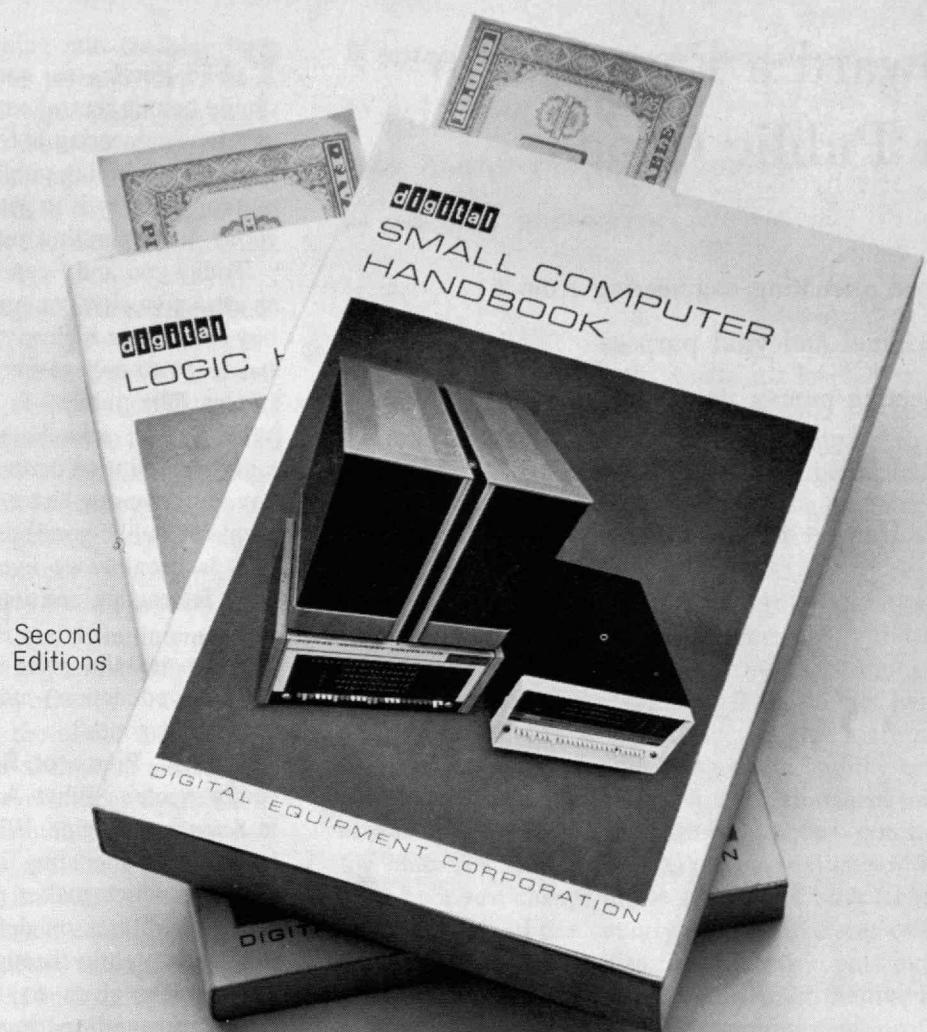
Bridges for McLean

To the Editor:

In the February, 1967, issue of your magazine there appeared on page 35 a small picture of a prefabricated bridge designed by William W. Pleasants, '33.

We have in McLean at least two busy intersections where such a bridge would solve our problems nicely. Since all roads in Fairfax County are under the jurisdiction of the State and not the County, it is my intention to try to "sell" this idea first to the Department of Public Works of the County and then to the State Highway Department. I will appreciate any help you can give me in gathering information.

MRS. HARRIET F. BRADLEY
Board of County Supervisors
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Toward a Partnership for Public Goods

Are we alienating engineering from its original and vital purpose of meeting human needs?

By J. Herbert Hollomon, '40



J. Herbert Hollomon, who will be a principal speaker at M.I.T. Alumni Day on June 12, is Acting Under Secretary of Commerce. He came to Washington in 1962 as Assistant Secretary of Commerce for Science and Technology following an 18-year career with General Electric Company and holds degrees in electrical engineering, physics, and metallurgy from M.I.T. (S.B. 1940, Sc.D. 1946). This article is based upon parts of Dr. Hollomon's address to the College-Industry Conference of the American Society for Engineering Education at Purdue University this winter.

Public goods—as contrasted with private goods—should be our central concern today. The great opportunity for engineering is to deal effectively with the problems of engineering public goods, and the great opportunity for industry is to get at the business of selling public goods and operating public institutions.

Today you and I can buy a house, but we cannot buy an attractive city; you and I can buy a car but we cannot buy an efficient highway; you and I can pay tuition for a son to go to college but we cannot buy an educational system. The public—in the small or large—buys these public goods: school systems, cities, suburbs, road systems, air pollution control systems, airways systems. Today an increasing share of your and my money is being spent for public goods as contrasted with private goods. This is because we live closer together, have become more interacting and interdependent than we ever were before.

What are the roles of engineering (especially engineering education) and industry in meeting our needs for public goods?

John R. Pierce of Bell Telephone Laboratories recently wrote: "What Are We Doing to Engineering?" in *Science* magazine. What we are doing to engineering, he said, is alienating it from the productive civilian economy which makes possible both our good life and our expenditures on defense and space. We are doing this inadvertently through the nature and magnitude of the support given to university engineering research by defense and space agencies. "If we are to remain strong and prosperous, we must take thought and action to draw engineering education and civilian industry closer together."

As Dr. Pierce points out, the Department of Defense, National Aeronautics and Space Administration, and Atomic Energy Commission are now together responsible for 80 per cent of the support for graduate engineering education in the United States. These and all other government agencies properly tend to support research that advances disciplines of importance to them. Thus our engineering schools are now concentrating on research in such glamorous and highly specialized subjects as aerodynamics, electronics, and solid-state physics, which lie at the very heart of the most sophisticated technology in this country and which do in fact give us the world leadership in the defense establishment and in space. But these are not necessarily the disciplines that are related to the civil, economic, or social goals of the U.S. or the rest of the world. The result is that most of our graduate education in engineering schools is graduate "scientific" engineering education, and the difference between the education of people to do engineering and to do engineering science is almost the difference between day and night. The science-oriented funding of graduate research biases the general direction of graduate engineering education and through it of engineering practice, and it is for this reason that I believe the basic balance of support must change.

This situation is self-perpetuating. Almost all of the

engineering professors now coming into teaching have doctorates based on this kind of research experience, and very few have had industrial experience. The teachers teach the students who teach the students who teach the students, and this assures us in endless cycle a supply of engineering scientists oriented to highly specialized and sophisticated problems. It is a cycle which in some part at least must be broken.

It is clear that the national agencies have a responsibility to ensure that the sophisticated disciplines of engineering and science pertinent to their business are well supported. I am simply proposing that support is also needed for the application of sophisticated techniques to industrial practice, the application of imaginative design to construction, the use of modern technology to control pollution, the application of imaginative engineering so that we are able to operate our motor vehicles without killing as many people each year as we kill in most large world wars. These subjects must claim the interest and commitment of engineers trained in graduate schools, for engineering education cannot be oriented only toward science. It must also emphasize the useful area of putting science to practical use, the technique whereby in an imaginative way one uses the resources available to conceive, design, develop, and manufacture devices and systems that have pertinence to our time.

We must not forget that it is the industrial machine, in the context of our industrial and economic society, which pays the price for the defense and space efforts, that disciplines important for national defense are not necessarily the disciplines that contribute to the improvement of industry or urban life and clearly are not the disciplines that improve the well-being of the three-quarters of the rest of the world's people that are neither as affluent nor as sophisticated as we.

The use of technology is almost never limited by technology itself. It is limited by social, political, and economic forces—the organization structure of a company, the attitudes of people. So I urge that the engineer, if he is to be effective in a modern world, has to be literate. He must have some concept of the society in which he operates—its economics, its politics, its art, its aesthetics, its laws. The society of engineers must encompass people who are deeply wedded to the value systems of our society—men who concern themselves with whether or not engineering is worth doing at all. It is a travesty, in my view, that engineers are responsible for the design of vehicles in which so many people are killed or maimed. It is a travesty that engineers are responsible for the design of industrial plants that pollute our atmosphere and our streams. Engineers must feel a sense of moral values through which they weigh the consequences for evil as well as the consequences for good of their work and make some judgments between them.

In the last 10 to 15 years graduate engineering education at the doctorate level has grown at the rate of between 10 and 15 per cent a year, though the increase in undergraduate enrollment in the same period has been negligible. Clearly an ever-larger proportion of our recent and current engineering students are continuing

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their education beyond the bachelor's level. Yet it remains true that we are now educating only a very small fraction of those that are capable of going on to their doctorates, and the rate of increase of graduate engineering education in my view not only can but must continue.

By 1975 the U.S. will need about \$1 billion per year for the support of graduate engineering education. Its total cost today is somewhere between \$200 and \$300 million a year, and the total contribution of industry is about 5 per cent of that number. If the tremendous future needs of graduate engineering education are not to be provided entirely by public agencies, and the universities' work oriented very largely to sophisticated national—as contrasted with industrial or public—goals, then the industrial leaders must take some initiative. There must be a vast change in the attitudes of both large and small industry of this country, leading to closer collaboration with the universities. And industry must increasingly accept the fact that, while the profit motive is the most important fuel for the economic system, profits in the near term, taken too rapidly, may prejudice profits in the longer term. Investments made today to eliminate some of the unfortunate consequences of engineering and to prepare new engineers for these broad-gauge services may pay off in the future.

Sir Ernest Rutherford, a great scientist, said his main concern was that science should be used properly in the development of the economy; and in one of his rare appearances in the House of Lords he advocated the establishment of a ministry of prevision to keep the government informed about the advance of science and technology and its probable impact upon industrial development. I would admonish both the university and industry to have a little prevision. Today more than ever we need this conceptual ministry of prevision—not a government agency or a formal institution, but an attitude of mind.

President Johnson was speaking to all Americans in his recent message on our natural heritage. He might have been speaking directly to engineers, about a partnership for public goods, when he said:

"Here in America we started out to do more than simply endure and make a profit. We intended to live as men should live, working hard, raising families, learning, building, breathing clean air, swimming in clear streams. If we are to have that America, and if the world is to have that kind of life, we shall have to master the consequences of our own prosperity—and the time to begin is now."

Recent Advances in Holography

Applications of lensless three-dimensional photography are spreading into many areas of physics, engineering and life science

By George W. Stroke, '56

It has long been a matter of common experience in optics that an ordinary photographic camera cannot be sharply focused onto more than one plane section of the three-dimensional world before it: the rest of the image will invariably be out of focus, to a degree depending on particular conditions, such as object distance, camera lens dimensions and focal length, among others. It had generally been admitted without question in the past that photographic storage of light-wave information in a *single* photograph would invariably result in an irretrievable loss of the third dimension in optical imaging.

Now holography has changed a good part of our textbook notions about optics. This new method of two-step interferometric waveform-reconstruction imaging, first described by Dennis Gabor in 1948, has succeeded in demonstrating the ability of "lensless photographs" (holograms) to store in an otherwise ordinary, black-and-white, photographic emulsion the complete imaging information required for reconstructing a true three-dimensional likeness of a scene, with its color, depth of field, parallax and all—exactly as it would appear to the eyes of an observer looking at the scene from the position of the hologram plate, had it been a window of the size of the photographic plate.

It is *not* the change of the light-wave pattern in front of the eye (or the camera), but rather the refocusing (or accommodation) of the eye (or of the camera) which brings into sharp focus objects at different distances in front of it. By suitably adding a plane or spherical coherent *reference* wave to the waveform reaching the camera from the three-dimensional objects, it becomes possible to store the complete 3-D imaging information before it enters the focusing lens. This information is recorded in the form of an interference pattern (called a hologram), from which the 3-D imaging waveform may be subsequently released, by illuminating the hologram with a plane or spherical wave of a shape similar to the reference wave used in the recording. The reconstructed waveform can be made practically indistinguishable from the original 3-D

imaging waveform, and the observer, looking through the hologram plate, sees a 3-D image which duplicates the original 3-D objects with a breathtaking realism.

Few fields in recent science have created a greater public excitement since the late 1950's when new life was introduced into optics through the invention of the laser, by Arthur Schawlow and Charles H. Townes, and through its first practical realizations, by Maiman and Javan, and others.

Applications of holography have already spread over more than a dozen distinct areas, from the physical sciences and engineering to biophysics and medicine, and of course to military and space applications. Recent innovations include 3-D microscopy, and nuclear particle-track photography, 3-D multi-color photography using black-and-white film, and multiply-exposed holograms used for interferometric investigations of vibrations and of stress, and for the study of high-speed aerodynamic and underwater acoustical phenomena. Various forms of 3-D cinematography, acoustical imaging, spectroscopy, and new theoretical simplifications, as well as high-resolution radar and optical computing, are other recent innovations, and so are pattern recognition, information storage, coding and processing, and now even computer-generated "synthesized" holograms capable of displaying 3-D images of objects which never existed in "reality"! There is good hope that holography may eventually help in a general solution of the phase problem in crystallography, and most of all in the 3-D x-ray "imaging" of proteins, the building blocks of living matter. And there is much talk also about 3-D television, for which more than one practical solution may already have been demonstrated in the laboratory.

More than 100 laboratories in the U.S. alone have already started to commit certainly more than \$10 million and perhaps as much as \$100 million per year, and hundreds of scientists, engineers, and students to this new field of interferometric photography for which the current name (holography) itself did not exist a little over two years ago. Similarly intense efforts are known to have started in many other countries as well, including France, Germany, England, and Japan. And work in most areas of holography, including the radar applications, was already reported publicly in the Soviet Russian literature as early as 1962, probably somewhat before the "new" holography publications started to originate in the U.S.

Here, however, a steady effort in this field had been going on continuously, for a time mostly at Stanford University, and later at the University of Michigan, ever since the field was originated in Britain in 1948, by the Hungarian-born physicist and engineer, Dennis Gabor, Professor of Electrical Engineering at the Imperial College of Science and Technology in London. It was he who coined the name "hologram," before I proposed the word "holography" in 1964 to honor and mark his basic contribution in originating the new branch of optics.

If the economic benefits of creating a new multimillion dollar activity are taken as "good"—and they may

be, no doubt, simply because of the large "spin-off" in requirements for new products (such as photographic films, optical, mechanical, and electronic devices, and most of all for the expensive and powerful lasers), as well as for new employment—the new activity has no doubt already become an unqualified success.

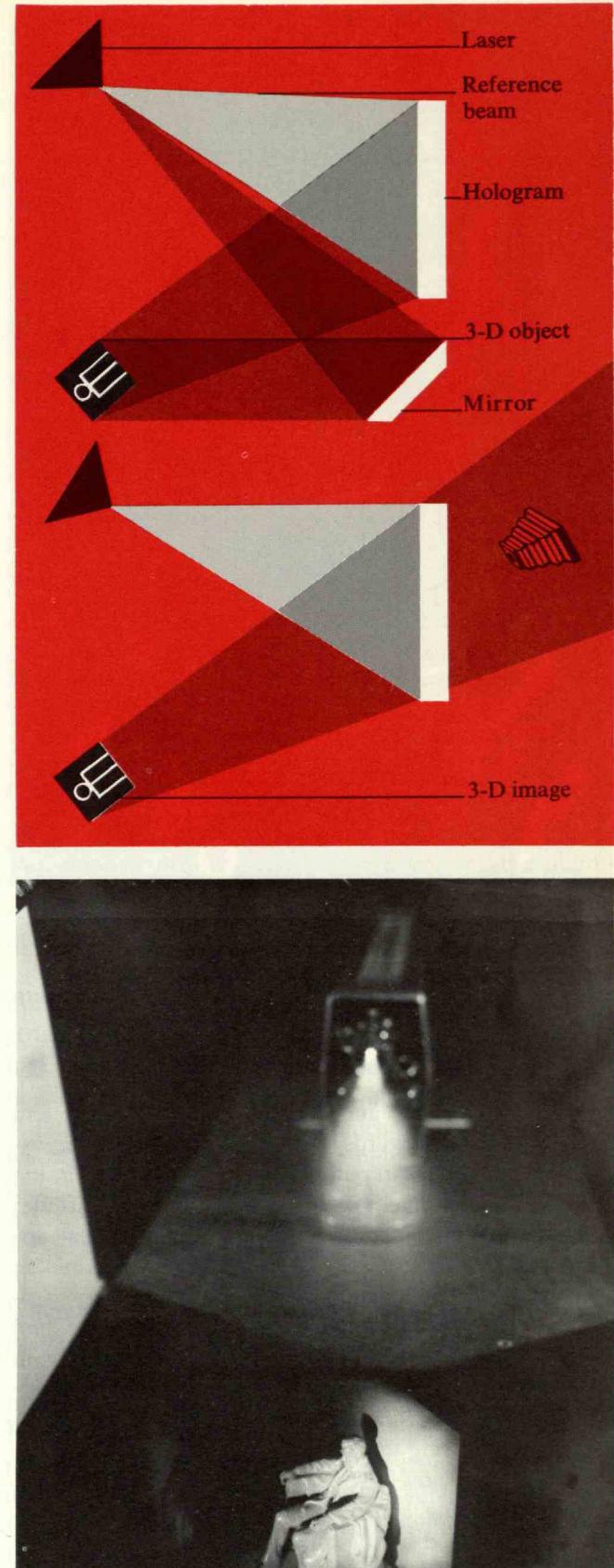
It is, however, the scientific and technological developments, and their probable impact on the solution of some of the problems at the frontiers of our scientific and technological expectations, which I wish to examine particularly here. Only time will reveal the degree of risk, and no doubt perhaps even some disappointments, in some choices of applications. However, so far even the most optimistic estimates of only a few years ago have already been exceeded in the twelve-odd different branches of this new field which has come to be known variously as "wavefront-reconstruction imaging," "lensless photography" and perhaps best as "holography" for short.

The Role of the Laser

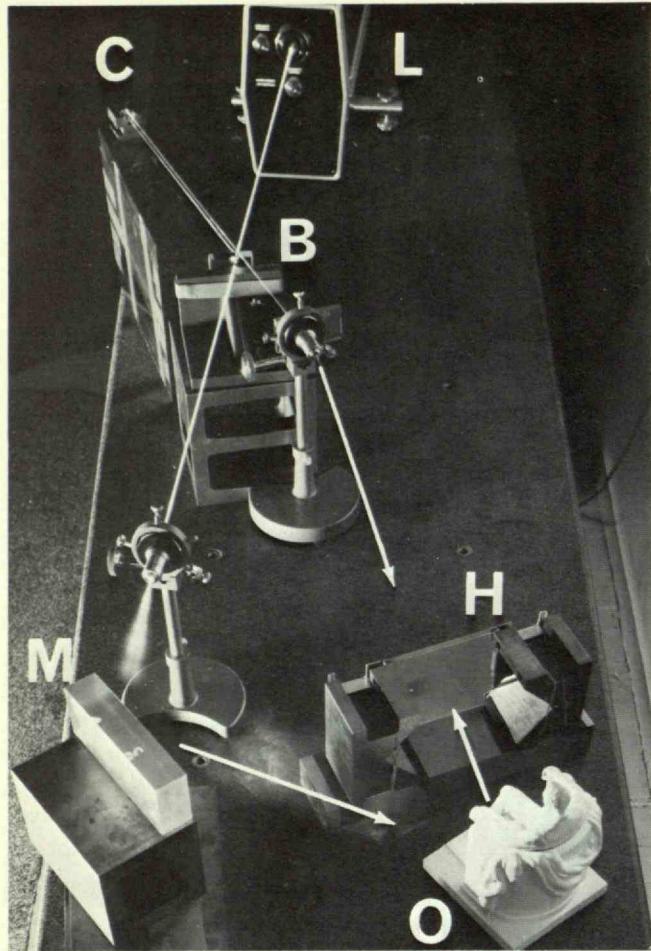
It was the introduction of the laser—that long-sought source of coherent light—which more than any other factor stimulated and made possible the explosively spectacular new advances in holography. The importance of the contribution made to optics by Charles H. Townes and Arthur Schawlow, in first describing the laser in 1958, and of Ali Javan and others in first realizing it in 1961 in its continuous-wave helium-neon form, perhaps the most popular so far, cannot be over-emphasized. More recently, the pulsed lasers with long coherence lengths, first realized by Maiman, have been finding increasing application in holography, notably in the photography of moving objects and of transient phenomena.

Dennis Gabor first described the field of "wavefront reconstruction imaging" in one of those short but complete scientific papers (*Nature*, 1948) which may still serve as an example of classical perfection in scientific publication. In less than 1,000 words and two figures, he set forth not only the new principle of optics—that of two-step interferometric photography—but also demonstrated his idea with the aid of a simple but crucial experiment, showing that all the important imaging information about three-dimensional space carried by a light beam wave could be retrievably stored in a single photograph, provided that the light beam was stopped before it entered a camera lens (or the pupil of the eye), and provided that a second beam (or coherent background wave) was simultaneously added to it, to store the imaging information in the form of a wave-front-interferogram (suitably called hologram, to indicate that the whole information was thus recorded). And Gabor performed the crucial interferometric photography experiment in 1948 with an ordinary mercury arc, at a time when perhaps even the thought of the laser had not yet germinated!

A history of the development of holography between 1948 and 1963 should include references to much important work, carried out by a number of people in



Basic principles of recording a hologram and reconstructing a three-dimensional image from it. To record a hologram (upper drawing), coherent light from a laser is split into two beams. The object to be recorded reflects one of these onto the film plate, where it forms an interference pattern with the other beam, known as the reference beam. The interference pattern so formed contains all the information necessary to produce a perfect, three-dimensional image of the original object when the plate is illuminated with coherent light, as shown in the lower drawing and the photograph.



Principles of white-light reflection holography, developed by G. W. Stroke and A. Labeyrie, which reconstructs holographic images in full color using ordinary white light instead of a laser. The method is based on recording a pattern similar to a diffraction grating throughout the thickness of the emulsion, by interference between beams striking opposite sides of the emulsion.

many places: Haine and Dyson, Rogers, Mulvey, and others working towards holographic electron-microscopy in England; Kirkpatrick, Baez and El-Sum, in the field of holographic x-ray microscopy in California; Larry Mertz and Young, looking at astronomical applications in Cambridge, Mass.; Lohmann working on theory and communication aspects in Germany; Cutrona, Leith, and Upatnieks, working on radar and military applications of coherent optical processing in Michigan. We may also mention G. Toraldo di Francia's remarkable work on the principle of "inverse interference," during this same period, in Florence, Italy.

However, it now seems that the most powerful impetus to creating a new excitement about holography possibly stemmed from a private suggestion I made after becoming "consultant" to the Michigan Radar Laboratory group in 1962, and notably during subsequent work in a team with E. Leith and J. Upatnieks in 1963 and 1964: I showed, on the basis of some very elementary but perhaps somewhat paradoxical electromagnetic theory considerations, that 3-D lensless holographic photography should be readily achievable with the aid of the newly available lasers, in complete keeping with the apparently somewhat forgotten original suggestion

of Gabor. The first published suggestion for the present form of 3-D laser holography appeared in a widely circulated set of my "lecture notes," published in May, 1964. Much of this work was subsequently incorporated into a now famous paper that Leith and Upatnieks published in the *Journal of the Optical Society of America* in November, 1964. The stage for the new era of holography was set.

From Two Dimensions to Three

In understanding how holograms store their information we must consider just how light beams carry information. Paradoxically, it is the phase of the electromagnetic waves in a light beam rather than the amplitude that carries the information which appears in any image in a field of light. This is demonstrated by placing a white sheet of paper in front of your eyes when looking at a general scene such as that before you right now: unless the paper is very near to a source of light, or directly in a shadow, the paper appears uniformly illuminated, without any variations of intensity across it, regardless of where it is placed in a room, outdoors, or anywhere. We must conclude that amplitude of the electromagnetic field representing the light is the same throughout the sheet of paper, and hence, throughout the region of space in front of our eyes. We may not conclude, however, that this apparent uniformity in the light field indicates an absence of information; clearly the eyes (or a camera) are capable of focusing this seemingly uniform field of light into a perfect image on our retinas or a photographic film. It is, in fact, the phase of the light field that contains the information.

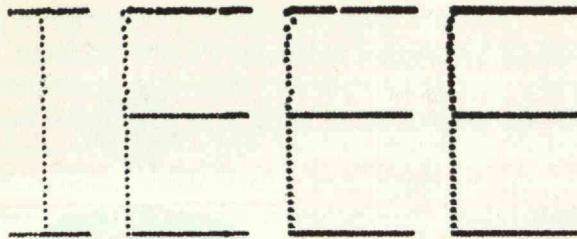
Now if a physicist is given the problem of recording the phase of some unknown wavefront, a wavefront reflected by a mirror, for instance, he will immediately think of an interferometer. In such an arrangement, he can make the unknown wavefront interfere with a known wavefront, and so store the unknown wavefront in the form of an interferogram. In holography, this interferogram is called the hologram. It is produced when the unknown, imaging wavefront interferes with the known reference wavefront. Clearly, recording of holograms is no more difficult (or indeed any simpler) than recording any other type of interferogram in optics, such as Newton's rings or Young's fringes.

Gabor put this very succinctly in his original paper: "The photographic record is produced by interference of the primary wave with the *coherent* part of the secondary wave emitted by the object. It can be shown that, at least in the outer parts of the diagram (hologram), interference maxima will arise very nearly when the phases of the primary and of the secondary waves have coincided."

In the light of this, it should be no great surprise that the very coherent light from lasers is of such great assistance in recording holograms. The figure on page 17 shows the methods of producing a hologram and reconstructing an image from it using laser illumination.

At this point it is pertinent to ask why we should expect any problems in recording 3-D imaging informa-

Hologram synthesis makes it possible to produce holographic images of objects which do not exist in reality, by building up a pattern of image points. In the recording arrangement, R is a combination of microscope lens and pinhole which provides the reference wave and Pi a "digitally" movable system of microscope lens and pinhole which produces the image points for the hologram H. The letters IEEE give an example of a reconstruction of a hologram recorded in this way.



tion on a 2-D photographic plate. In fact, what we generally call 3-D objects are really only 2-D surfaces, albeit with depth and a rather complicated description. Accordingly there is no problem in producing a hologram, for we are merely mapping the characteristics of one 2-D surface onto another. It is this characteristic of storing a three-dimensional field of light on a two-dimensional photographic plate which illustrates the truly three-dimensional nature of holography.

The situation becomes quite different, however, when we come to photograph truly three-dimensional structures, such as crystals as they appear to x-ray radiation; in this case more than a single photograph is generally required to store the information required for 3-D reconstruction. A similar situation arises in cases where we wish to photograph the inside of a boxlike object, or even a scene in which some of the objects are completely masking others behind them, as seen from the entire aperture of the window-like hologram. The hologram, in the same way as direct observation through a window of the same size as the hologram, is incapable of recording any part of a scene that is completely obscured from it.

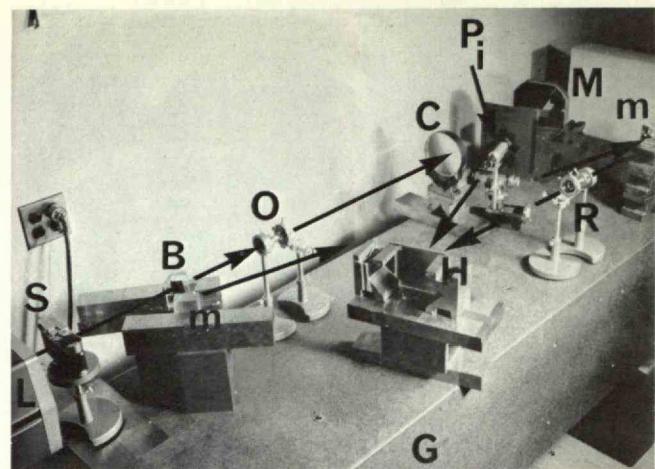
Even though an extensive mathematical description of holography requires more space than is available here, it is my experience that at least a brief description of the two equations which characterize the two-step imaging process of holography is helpful in answering the many questions which may come to the mind of a mathematically inclined reader at this point. The theoretical sketch which follows is not needed to understand the remainder of the article, and may be omitted by the nonmathematical readers.

Theory of Holography

I must first recall that the imaging information in optics is carried in the spatial phase $\phi(x,y,z)$ of the electric field vector $\tilde{E}(x,y,z) = \tilde{E}(x,y,z)e^{i\phi}$, and that the quantity recorded in a photographic emulsion is the time average of the electric field vector magnitude squared, namely the intensity

$$I(x,y,z) = \langle \tilde{E}(x,y,z) \cdot \tilde{E}(x,y,z)^* \rangle = \langle |\tilde{E}(x,y,z)|^2 \rangle.$$

Let us now assume that the electrical field-vector distribution produced in an (x,y) plane just in front of the observing eyes, by the object, is $\tilde{E}_o(x,y) = |\tilde{E}_o|e^{i\theta_o}$,



when the object is illuminated in coherent laser light. In order to record the phase $\phi_o(x,y)$ we add to the object field a "coherent reference field," for instance in the form of a plane wave $\tilde{E}_r(x,y)$. The two waves interfere, and the resultant intensity recorded in the photographic emulsion (the hologram) is

$$\begin{aligned} I(x,y) = & |\tilde{E}_o|^2 + |\tilde{E}_r|^2 \\ & + \tilde{E}_o \tilde{E}_r^* \\ & + \tilde{E}_o^* \tilde{E}_r \end{aligned} \quad (1)$$

Equation (1) the "recording equation" shows that the object field $\tilde{E}_o = |\tilde{E}_o|e^{i\theta_o}$ has been stored in vector form, and notably that its phase portion has been stored, as desired. A comparable equation characterizes the recording $I(x,y,z)$ through the volume of a "thick" emulsion, such as the recording of the color holograms, described in the next section.

Surprisingly, the hologram, described by equation (1), even though being a "negative," may be used to reconstruct a "positive" image without any inversion or printing! This may be readily explained as follows, by first making a simplifying assumption in the recording.

Let us assume that the reference field \tilde{E}_r used in the recording is a wave of unit amplitude, so that the intensity distribution in the hologram is

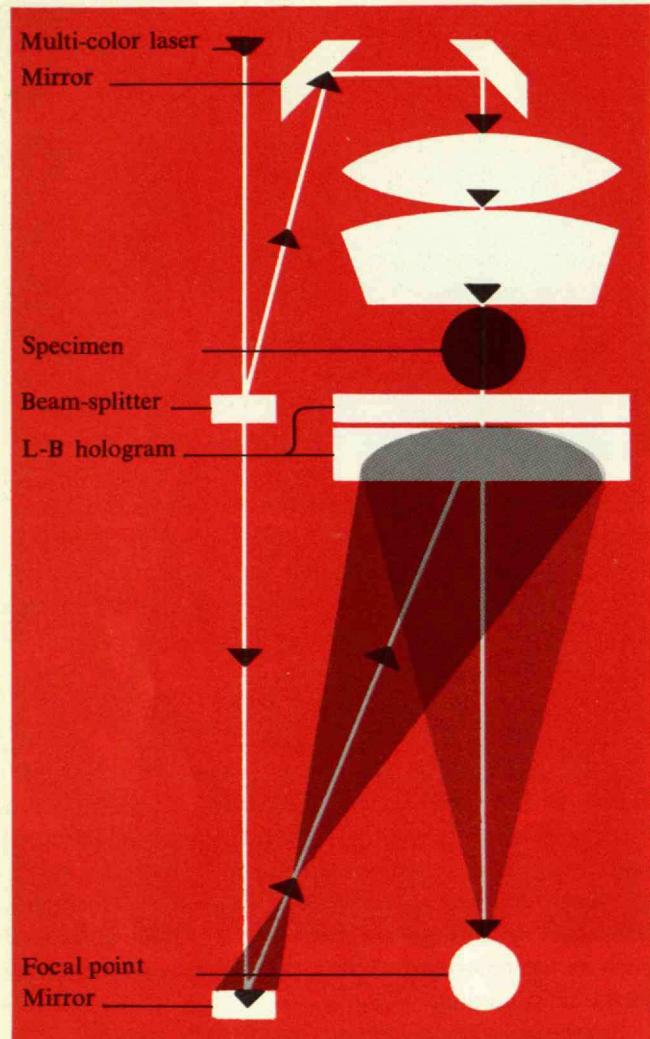
$$\begin{aligned} I(x,y) = & [|\tilde{E}_o|^2 + 1] \\ & + \tilde{E}_o \\ & + \tilde{E}_o^* \end{aligned} \quad (1a)$$

Where the intensity is the largest, the hologram (photographic plate) will be the darkest, and vice versa.

To reconstruct the "image" with the aid of this hologram, it is only necessary to reconstruct the object wave \tilde{E}_o . This may be achieved, for example, simply by replacing the hologram plate into its recording position, and by illuminating it with only the reference wave \tilde{E}_r (here equal to 1). Clearly, most light will be transmitted through the hologram where it is the least darkened, and vice versa. Accordingly, the wave-field transmitted through the hologram is approximately equal to

$$1 - I(x,y). \quad (2)$$

Equation (2), which we may call the "reconstruction equation" immediately indicates that the wave-field reconstructed by the hologram is proportional to the recorded intensity $I(x,y)$ and that one of the three portions of the reconstructed wave-field is indeed a faithful replica of the object field \tilde{E}_o ! It can be readily shown that the



High-resolution, three-dimensional microscopy in color is one important application of the author's method of white-light color reflection holography. By introducing the

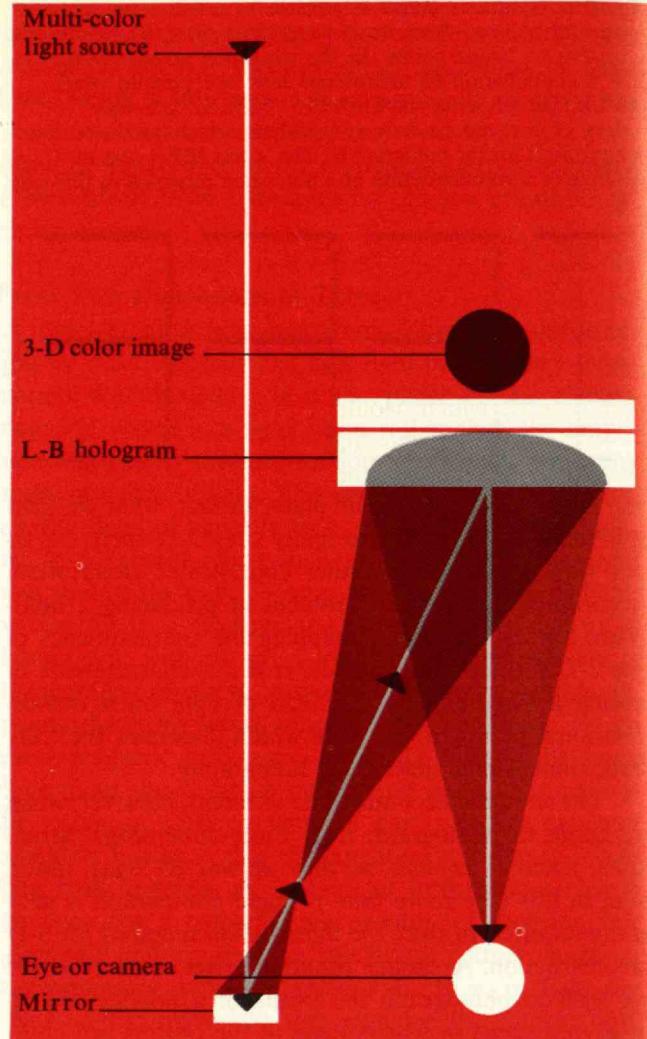
two other portions of the reconstructed field, namely the waves \bar{E}_o^* and $[\bar{E}_o|^2 + 1]$ are angularly separated from the image wave \bar{E}_o , in all usual holograms, including those recorded according to Gabor's original scheme. In fact, in the new type of "white-light reflection hologram" described below, the two "undesired" portions of the reconstructed field propagate away from the observer, while only the desired image wave is reflected back to the observer, when the hologram is illuminated from the observer's side! Only a slightly more elaborate theory is required to describe essentially all other types of holograms.

Holograms in Color

Much of the new interest in holography results from applications which involve holograms of a more complicated type than those I have dealt with so far. Many complex types involve the following two principles:

- Recording with a reference wave more complicated than a plane (or spherical) wave (in coded holograms, for example).
- Superposition in the same hologram of more than one "component" hologram.

This latter principle can be understood as a super-



reference beam from the back of the plate (left), the experimenter can place the plate close enough to the specimen to obtain good magnification in the reconstruction (right).

position of intensities. An example of this occurs when several holograms recorded with light of different colors are superposed in the same photographic plate. Each individual color-component hologram results from interference, in the same emulsion, between the light of the component color, as scattered by the object, and a reference wave of the same color. The superpositions may, but need not, be carried out simultaneously.

Another interesting advance in holography came last year, when I described with my student Antoine Labeyrie a method for reconstructing holograms with white light, rather than laser light. The method has particular interest because the holographic information is now reconstructed by reflection, instead of transmission of the reconstructing light, from information stored throughout the entire volume of the emulsion. In preparing the hologram, the beam of light from the object and the reference beam are now made to strike the photographic emulsion from opposite sides. As we predicted, reconstruction of these holograms by white light takes place through a diffraction process, analogous in many ways to the diffraction that occurs in x-ray crystallography.

The Russian Yu. N. Denisyuk published an early

theory of this type of reflection hologram recording in 1962, for the case in which the object was illuminated through the hologram, rather than with a split reference beam. He also described experiments in which he had used mirrors as objects and had recorded his holograms with mercury light, but he showed no photographic results, presumably because of the well-known difficulties in recording good holograms before the laser.

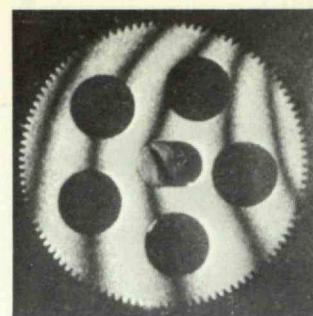
More recently, Dennis Gabor has pointed out that our methods of white-light reflection holography could be used to generate novel types of holographic optical elements, such as perfect mirrors, completely free from aberrations, which would have significant advantages over optical elements manufactured by conventional techniques. Focusing concave diffraction gratings, without the usual aberrations, can be created holographically in this manner.

One of the most important applications of our white-light method may perhaps end up as the solution to the problem of high-resolution 3-D color microscopy. However, one must first overcome the problem of illuminating the object with the reference beam. In conventional 2-D high-resolution microscopy, the front lens of the microscope comes almost into contact with the object; "immersion" lenses and oil are frequently needed to achieve this. For a 3-D recording it is necessary to place the hologram plate equally close to the microscopic object. Clearly, no room remains for readily introducing a reference beam from the side of the object by the conventional methods. However, introducing the reference beam from the back, according to our reflection-holography method, naturally solves not only the problem of high-resolution holographic recording, but also that of simultaneous multi-color holography.

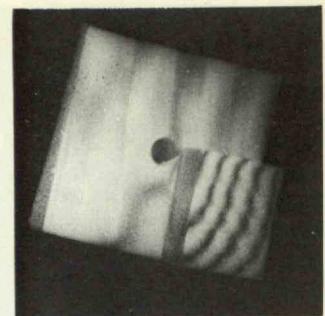
Objects illuminated in laser light, and their holographic reconstructions, tend to possess a "grainy" appearance. We have recently discovered that this annoying characteristic, and the considerable loss in resolution of detail which accompanies it, virtually disappear if the object or its reconstructed image is observed with a considerably enlarged "pupil"—for instance, with a 30-mm diameter pupil rather than, say, the normal 3-mm diameter eye pupil. For instance, a telescopic system may serve to achieve the enlarged pupil. A large iris aperture in the camera photographing the object or its reconstructed image achieves the same effect. This holographic "image smoothing" should be of great interest in further improving holographic microscopy.

Measuring Strain and Vibrations

A number of scientific groups have taken advantage of the possibility of superposing more than one component on a hologram plate to carry out accurate measurements of strain in mechanical parts—an application which has great promise for testing machine parts. The method relies on interference between the reconstructed images from two exposures of the same object. The interference fringes produced by superposing the two reconstructions give a direct measure of the topological



PHOTOS: DR. NASSENSTEIN, BAYER-AGFA INC.



Holographic interferometry gives a direct measure of topological changes in an object between two exposures. Two hologram recordings are made of the object on the same plate, and are reconstructed simultaneously. Slight differences in the object's dimensions at the two exposures produce interference fringes in the combined reconstruction. Photograph at left shows dimensional changes in a gear after slight heating of one side; the change amounts to about 1.2 microns from left to right across the gear. Right-hand photograph shows swelling in the corner of a piece of wood during one minute, after the wood had been swelling in water for about an hour. This method has already found many applications in studies of vibration and similar effects.

changes of the object between the exposures.

Significantly, holographic interferograms permit us to study deformations in objects of great complexity. Moreover, the objects need not be mirrorlike, but can in fact be perfectly diffusing, like the piece of wood shown above. The method has already found wide applications in the study of vibrations, for instance in measurements of sonar transducers, loudspeakers, etc. It could also measure very small dimensional changes in inertial guidance components, such as gyroscopes under dynamic conditions, stress-deformations, etc.

We can extend this principle to obtain "live" interferograms. To achieve this, we place a single hologram of an object into a recording position at which it reconstructs its image exactly upon the object used to record it. If light from this object as well as light from the reference wave passes through the hologram, interference occurs between the waves from the object and those from the reconstructed image, to produce the live interference pattern. However, great care must be taken in such work to prevent the emulsion from deforming the wavefronts.

The experiments on holographic interferometry point to an important conclusion regarding stability in recording holograms. Any movement of the object greater than about a millionth of an inch during exposure of the hologram may cause a noticeable degrading of the image. Should parts of the object move as much as a quarter of a wavelength towards the hologram plate, the reconstructed image will be covered with a pattern of interference bands similar to those deliberately achieved in interferometric holography. Degrading will likewise result from changes in the temperature of the object or the hologram plate during the exposure.

Generating Holograms by Computer

Considerable interest has arisen recently in exploring the possibilities of applying holographic principles to digital computer display and other computer applica-



Grainy appearance is one annoying feature of objects and their holographic reconstructions when they are illuminated by laser. However, this graininess essentially disappears if the object or its holographic image is viewed through an enlarged "pupil"; a 30-mm diameter pupil, achieved by using a large iris aperture in the camera, greatly improves the resolution of a holographic image compared with the normal 3-mm diameter eye pupil.

tions. Indeed, it has now become possible to generate holograms capable of displaying 3-D images of objects which never existed in reality. The method, which my colleague Professor F. H. Westervelt, my student R. G. Zech, and I described in the January, 1967, issue of the *Proceedings of the Institute of Electrical and Electronics Engineers*, makes it possible to synthesize interferometrically two- and three-dimensional holograms from a set of computed co-ordinates in space. It bypasses the need to compute the distribution of intensities in the hologram from the given co-ordinates, to draw this distribution on a large scale, and to reduce such photographs photographically; all three steps were required in previous methods of hologram synthesis from drawings. The quality of the images obtained by holographic synthesis in general appreciably exceeds that obtainable from drawings or reduced photographs. Moreover, and paradoxically, the quality of the images produced by the holographically synthesized holograms may in some aspects exceed the quality which would be obtained from the corresponding holograms of actual objects, had such been available!

3-D Images with "Conventional" Cameras

It generally appears to have been accepted without question in the past that the third dimension in a conventionally focused photographic system would be irretrievably lost when recorded on a simple two-dimensional photographic plate or film. In fact, the recent dramatic advances in three-dimensional lensless photography that I have described have made it appear that "unfocused" scattered waves might be essential elements in recording holograms capable of reconstructing three-dimensional images. But some of our recent experiments, confirming earlier work, have shown that one should not expect any difference between an "unfocused" electromagnetic field (such as that in a wave-front in front of a lens) and a "focused" field (such as that in an image, in the focal region of a lens).

In normal photography, the camera lens forms real images of a three-dimensional scene, and these images exist in three-dimensional space; however, the ordinary photographic film collapses these images into a single plane. Holography achieves its three-dimensional effect by recording the reference wave simultaneously with the object; we have now shown that it is possible to restore the third dimension with a conventional photographic arrangement, simply by adding a coherent background wave to an otherwise conventionally focused image. This may also prove of interest in certain telescopic and microscopic applications.

In simple words, the introduction of a coherent background literally makes it possible to transform what would have been an "ordinary" two-dimensional photograph into a "true" three-dimensional one, capable of displaying all the three-dimensional characteristics—such as depth of field, parallax, etc.—of the unfocused-wavefront hologram. In essence, this shows that it is the coherent background, and not the lensless recording, that makes 3-D holographic imaging a reality.

Coding By Hologram

As an example of the present form of advances in holography, which have resulted from purely mathematical considerations, it may be of interest to mention another paradoxical aspect of holography. We now know that the coherent background is strictly speaking not necessary in holography under some circumstances.

This method, which may be called an *a posteriori* holographic "resolution retrieving" (or compensation) method, was first recognized and described by Stroke *et al* already in 1965. It is especially useful in view of holographic x-ray microscopy applications, where it may help in unraveling such complicated macromolecule structures as those in proteins which are not yet accessible to the powerful methods first described by Perutz and Kendrew, and others. But this is yet another story.

Many other important recent advances have occurred in this exciting new field. I have singled out just a few, mostly because of their fundamental importance, and for their relation with the work that my collaborators and I are carrying out at the University of Michigan. They serve to illustrate the wide scope of this exciting new branch of science which had lain virtually neglected until the advent of the laser. ■



George W. Stroke, Ph.D. (physics) from the Sorbonne, is currently professor of electrical engineering at the University of Michigan. There he first initiated research in 3-D holography in 1962, and has since continuously stimulated much of the research in this field by numerous scientific contributions, the first book in the field and by world-wide lectures. Dr. Stroke is a Fellow of the American Physical Society.

Mental Effects of Malnutrition

Accumulating evidence suggests that malnourished children are denied all hope of reaching their human potential

By Peter Gwynne

Acting Managing Editor, Technology Review

It is a paradoxical fact that the great improvements in medical science and the control of disease during recent years have given rise to two of the most intractable problems that the world faces today—the population explosion and the shortage of food. The birth rate in underdeveloped countries has always been high, but traditionally the equally high death rate has ensured relatively stable numbers among the populations. The impact of modern medicine and public health has greatly increased life expectancy. So far, however, the social and political conditions to impel a similar decrease in the birth rate have not arisen. As a result the number of people in the world is increasing far faster than food supplies, particularly in the underdeveloped areas, and the majority of children born in these regions come into a physical and social environment that is totally unable to feed them adequately.

The physical effects of this early departure from the equality of all men are disturbingly obvious. In general, children in underprivileged populations are smaller than their well-fed counterparts, quite regardless of genetic considerations such as the height of their parents. Nutritional diseases such as kwashiorkor and marasmus take a heavy toll of these children, and even today's medicine must fight hard to hold down the death rate among malnourished young children to between 10 and 30 times that among the well nourished.

Recently, evidence has been accumulating from laboratory studies with animals and from field studies among underprivileged societies to suggest that the effects of early malnutrition extend beyond children's physical development. Increasingly it appears that lack of sufficient calories and protein can permanently retard the mental abilities of children. If this is indeed true, over 300 million children under the age of six have already lost the opportunity of realizing their full human potential.

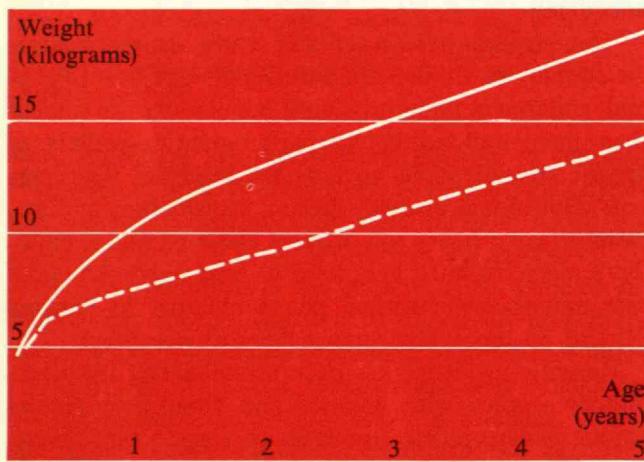
These implications of malnutrition for those who survive it have only begun to emerge over the last 10 years. Previously, workers in the field had to devote their time and effort to seeking the causes and prevention of the appalling death rate from malnutrition among children. Only now can they begin to turn their attention to those who stay alive.

The picture built up by the few studies already underway is in many ways just as disturbing as the high death rate. In order to review the present evidence for the connection between malnutrition and behavior, and to design new methods of studying the link, experts from over 30 nations gathered recently at M.I.T. for an international conference under the title "Malnutrition, Learning and Behavior."

The Background of the Problem

The conference's first two papers, by Dr. Angus Thomson, of the Princess Mary Maternity Hospital, Newcastle-upon-Tyne, England, and Dr. Moises Béhar, Director of the Institute of Nutrition of Central America and Panama (INCAP), pointed out the consistent pat-

Increase in weight of well-nourished Central American children (continuous curve below) and children of rural and poor urban families (dotted curve). During their first six months, when breast milk fulfills all their nutritional needs, the underprivileged children develop as fast as the privileged group. But at weaning, when they face the twin hazards of disease and inadequate food, the underprivileged children lose ground they never make up. In extreme cases the children succumb to nutritional diseases such as marasmus, illustrated on the opposite page. Evidence is now accumulating to suggest that children malnourished in early life also suffer permanent mental retardation.



tern of life among young children in any underprivileged population.

Children are breast fed well into their second year of life. Weaning begins at about six months with small amounts of food regarded as acceptable and safe for infants, such as thin gruel or rice. By the time a child reaches one year of age he is receiving most of the food the adults and older children eat—but with some notable exceptions. Certain items in the adults' diet, particularly meat and vegetables which are important sources of protein, are denied to the small children because they are regarded as unsuitable for them.

The reasons for withholding these foods from the infants are many and complex; religious and cultural taboos combine with unwillingness to use frequently contaminated food and plain ignorance of nutritional factors to deny the children a properly balanced diet from the scanty amounts of food available. The Muslim religion, for example, forbids its followers to eat pork; orthodox Hindus are forbidden beef, and certain Christians must not eat goat. In most impoverished societies, the father traditionally receives the best food, while the rest of the household must be content with the remainder. And certain sources of protein, notably cows' milk, are so germ-ridden that they would represent definite risks to infants who have lost the placental immunity they gained in the womb and have not yet built up their own natural defenses to disease.

For these reasons, and because of lowered resistance to infection caused by malnutrition, children fall foul of case-books of debilitating diseases as soon as weaning starts. Measles and whooping cough—diseases which urbanized children do not encounter until their school days, when they are far better equipped to combat them—abound among one- and two-year-olds in underdeveloped societies. Even more serious are the diarrheal diseases that the unsanitary environment makes a natural hazard of life.

To add to their troubles, the young children simply receive insufficient quantities of food. The purpose of giving infants adult food is to allow them to develop the taste for it rather than to provide nutritive value. And as the children get older their mother's milk becomes increasingly inadequate in proteins and calories. Thus, at a time when they are going through the traumatic process of weaning, and first coming up against disease, the underprivileged children are made nutritionally backward.

The synergistic effect of malnutrition and disease is reflected in the growth patterns of children in different underprivileged societies with alarming consistency. For the first six months of their lives, when breast milk supplies all their nutritional needs, the children thrive; in fact they gain weight and height as fast as, or even faster than, groups of well-fed urban children. But as soon as they face the twin impact of weaning and disease their growth rate takes a downward turn compared with the well fed. Not until the age of four years does their rate of growth catch up with that of urban children, and they never make up the physical development lost in these early years.

Dr. Béhar gave vivid illustration that the pattern of feeding and growth crosses cultural and racial boundaries. Studies among underprivileged groups in Guatemala, South India, Uganda, Mexico, Thailand, New Guinea, and China show the same principles of infant feeding—prolonged breast feeding, supplementary solid preparations introduced late, in small quantities and poorly selected—and the same depressing fall in growth rate at six months.

There is some evidence to suggest that, among malnutrition and disease, the former is the predominant partner in its effect on physical development. Dr. W. R. F. Collis, of the University of Lagos, reported a study among children in two groups of Nigerian villages; one group of children had enough to eat, but the other did not.

The growth curves for both groups remained well below those of a control group of urban children between six months and three years, when the effects of disease were at their worst. But by four and a half years the adequately fed children had begun to catch up with the growth of the controls, and by 10 years they had reached virtually the same average heights. In contrast, the malnourished children fell further behind the growth of the controls as they became older. Thus, it appears that, while disease slows up physical development temporarily, malnutrition slows it down permanently.

Malnutrition in the Laboratory

The connection between lack of food in early life and physical retardation is perhaps not surprising. But why should malnutrition in early years also be suspected of having an effect on the brain? One very strong reason for investigating a connection is that by three years of age a child's brain has reached 80 per cent of its full size, though the child has only grown to about 20 per cent of his full height. In animals the proportion between growth rates of the brain and body is similar, but of course they attain this amount of development far faster; rats, for example, achieve 80 per cent of their brain growth by four weeks and pigs by eight to 10 weeks.

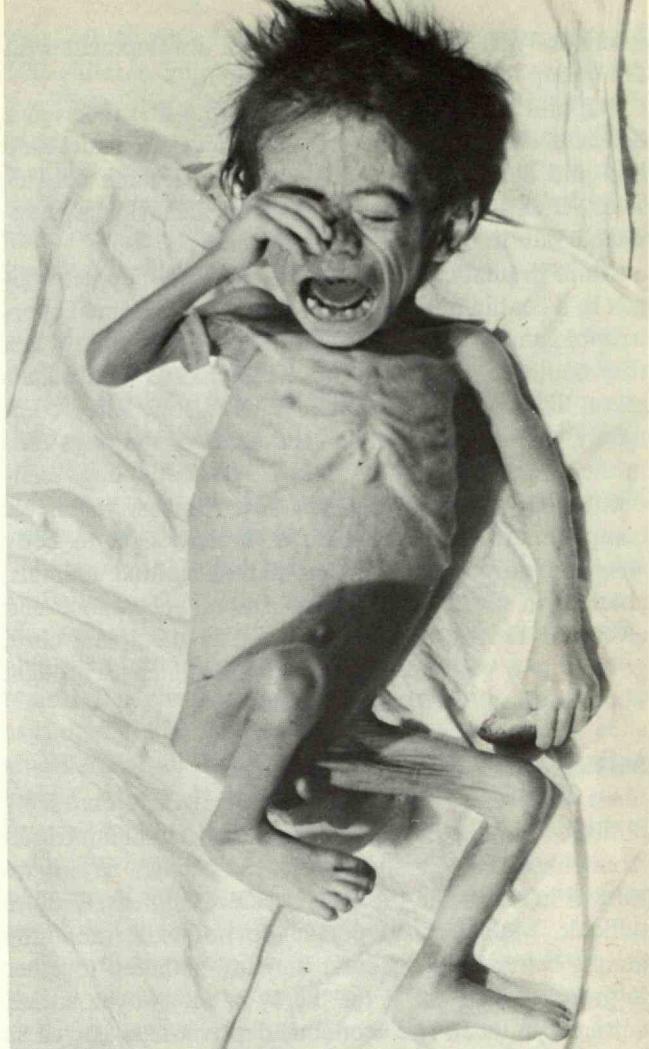
Because their brain growth is so rapid, animals have been used in the laboratory to provide much of the evidence that suggests a link between malnutrition and behavior. In addition experimenters in the laboratory can remove, or compensate for, the many environmental factors that inevitably influence field studies on human populations, and can look specifically at extremes of undernourishment. But scientists must exercise great caution in extending the results of animal studies to humans.

In setting out to study animals, the question arises of whether it is possible to measure quantitatively any damage that malnutrition causes to the brain. The effects of malnutrition on animals' behavior has been demonstrated clearly enough, but can we relate the behavioral changes to physical parameters in the developing brain?

The actual weight of the brain is a notoriously poor index of its state of development, but the concentration of various brain constituents—lipids—may give a more helpful indication of the brain's physical state, according to work on undernourished pigs reported by Dr. John Dobbing, of the Institute of Child Health at the University of London. He found strong evidence that the concentrations of certain lipids fall below their normal values under early malnutrition and do not improve even when the pigs are put back onto a normal diet.

Similar studies on rats suggested strongly that under-nutrition in the period when the brain is growing at its fastest rate restricts its growth seriously and permanently. Dr. Dobbing's team separated rats into two groups of litters at birth; the privileged litters contained three rats apiece and so each had ample access to the mother's milk; the underprivileged litters of 15 to 20 were inadequately nursed. At weaning, when they were three weeks old, all the rats had access to unlimited food until they were 28 weeks old; then they were killed and examined. The underprivileged rats had a definite deficit of certain brain lipids. Prolonging the malnutrition beyond the weaning period appeared to have no greater effect on the concentrations of these lipids.

These studies are significant because rats' brains grow fastest during their first three weeks of life. The equivalent vulnerable period in human babies comes in the last few weeks in the womb and the first few months after birth. If there is any true analogy, therefore, the



so-called dysmature babies—who are born at full term, but have the size and development of premature babies—would appear to have suffered some permanent mental damage at birth.

A slightly different approach to measuring brain damage was highlighted by R. J. C. Stewart, of the National Institute for Medical Research in London. In collaboration with Professor B. S. Platt he has carried out studies on malnutrition in pigs and dogs, examining brain cells, electroencephalograms and the state of the spinal cords for evidence of damage to the central nervous system.

Definite physical damage occurred in pigs fed upon diets low in calories and proteins; further, the extent of damage and behavioral disorders became more severe the earlier the animals were put onto the diet.

The work on dogs was designed to take malnutrition back into intra-uterine life. Puppies from underfed mothers were divided into two groups on weaning, one given a diet of low-protein value and the other a high-protein diet. Two groups of puppies from normal mothers were put onto the same diets, as controls.

The puppies from the malnourished mothers were small at birth and classed as dysmature. At weaning they weighed far less than the normal puppies, walked with stiff-legged gaits, and showed head tremors. The group of these puppies who then received the high-protein diet at weaning gradually lost their nervous char-

acteristics and began to catch up in development with the group well nourished throughout.

Puppies born of normal mothers who first received a deficient diet at weaning gradually developed stiff hind legs and head tremors and tended to become convulsive. After four or five months this behavior was reduced but it never disappeared entirely.

More dramatic changes occurred in the puppies subject to a continuously deficient diet. They became hyperirritable and lacked interest in the outside world. When they could be induced to move they did so with a kangaroo-like hop, as all four legs were stiff. They commonly suffered convulsions, and some of the dogs died in the midst of them. At about 12 weeks the dogs' condition generally improved, but their recovery was never complete. Although the ratio of brain weight to body weight hardly differed from that in normal animals, changes in the chemical composition, appearance and electrical activity of the brain, and in the spinal cord, gave ample evidence of irreversible damage brought about by malnutrition.

Studies among Deprived Populations

Even when one is dealing with animals it is extremely difficult to isolate the effects due directly to malnutrition from those brought about by social factors. When we turn to humans, the problem becomes immensely more difficult. Malnourished people do not exist randomly among better-fed neighbors: they are gathered together in groups which are at the mercy of interwoven social, cultural, political, and economic deprivations, as well as nutritional ones. It is little cause for wonder, therefore, that few studies have yet emerged of the relationship between malnutrition and human learning and behavior.

The difficulties of measuring the mental effects of undernourishment in animals pale into insignificance when compared with the problems of measuring any meaningful effect, physical or mental, in human populations. Even the universally small size of people in malnourished societies might be basically a genetic effect—their adaptation through many generations to the shortage of food. And might not urbanized, privileged babies in fact be overfed?

At some point, obviously, researchers must stop speculating and start measuring something. Apart from I.Q. tests, whose results can be rather equivocal indicators of mental development, a useful index of brain growth and development likely to be influenced by nutritional factors is the circumference of a child's head. (I must stress, however, that this is meaningful only when one is comparing average values for groups of privileged and underprivileged. Experts hasten to deny that the fact that women generally have smaller head circumferences than men means that they are any less intelligent. But the large differences in average head circumference between groups of privileged and unprivileged are very likely associated with differences in intelligence.)

One of the most dramatic pieces of evidence to relate malnutrition with retardation of brain growth has come

from a South African study based on measurements of head circumference, among others. Drs. P. M. Smythe and Mavis Stoch, of the Red Cross Hospital in Cape Town, South Africa, have been observing two groups of Cape Colored children since 1955. As the malnourished group they selected the 20 most grossly undernourished children they could find; they also selected a control group matched with these children for sex and age. During the period of observation the average head circumference of the malnourished children has remained consistently one inch smaller than the average for the controls. In addition, the electroencephalograms of the undernourished group have shown more abnormalities which can be related to behavioral disorders; the children in this group have advanced less in school than the controls, and they have performed poorly on intelligence tests.

When Drs. Smythe and Stoch published a preliminary account of their work in 1963, their conclusion that malnutrition was indeed the cause of the mental retardation evoked widespread doubt, because of the complicating social factors involved. Alcoholism, illegitimacy, and broken homes abounded among the undernourished group, while the controls came from reasonably stable homes. However, Dr. Stoch reported that the living conditions of two thirds of the undernourished group have steadily improved over the years, without obvious effect on their mental development. Thus she reiterated her belief that early malnutrition was the prime cause of the children's defective intellectual development.

Dr. Joaquin Cravioto, now of the Hospital Infantil de Mexico in Mexico City, who is one of the pioneers in field studies of malnutrition, used psychological tests to measure intellectual abilities in a study among children of school age in a rural Guatemalan village, in a project under the auspices of INCAP. In these tests the children were asked to replace differently shaped wooden blocks in corresponding holes, and to indicate whether a hand moving behind a screen traced out the same shape as the object in front of them, and whether a block they could feel behind a screen was the same as one they could see.

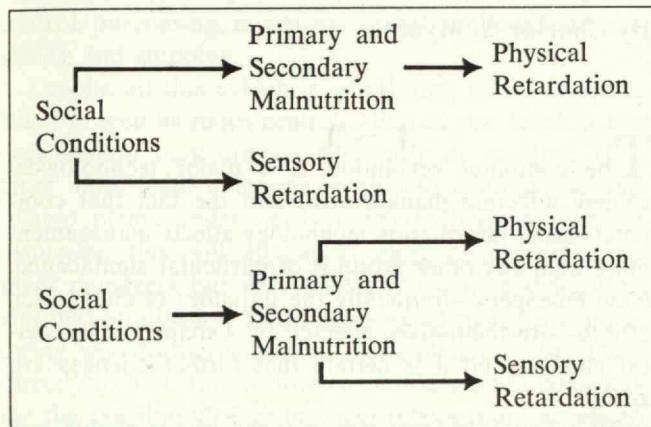
Dr. Cravioto's team selected the children in the village according to their weight or height (for age), and chose to observe the relative performances of the upper and lower quartiles of weight or height. The children's heights appeared to have no relationship with those of their parents, and the team therefore assumed that the smaller children were undernourished. As control groups, the team observed two similar sets of upper-class urban children; the heights of these children did depend on their parents' heights, and presumably reflected genetic factors.

The children in the urban groups performed consistently better on the psychological tests than those in the rural groups at all ages, and the two urban groups showed no difference in performance. However, the taller children in the rural group scored consistently higher than their shorter contemporaries, again suggesting the influence of malnutrition on mental abilities.

The Need for Field Studies

Such evidence, convincing as it may appear, in no way proves the primary connection between malnutrition and behavior. The studies completed so far are but small drops in a very large ocean, most of which has yet to be navigated.

Dr. Cravioto, in common with other speakers, was at pains to stress the complicated pattern of cause and effect between cultural and nutritional factors and behavior. Put at its simplest level, the conference was aiming to decide the relative applicability of two models for the cause of retarded learning behavior, which are best expressed in diagrammatic form:



But of course such simplified portrayals bear little relationship with reality, and the evidence is too scanty to provoke decisions on any model of the relative effects of social and nutritional factors. In view of the vital implications of the subject, it is essential now to set up field studies in many underprivileged areas, and the final day of the three-day conference was devoted to discussions of the nature of future field studies.

Dr. Cipriano A. Canosa, of INCAP, set out the basic framework for any field study:

- The team must take a longitudinal approach, following a group of children through their early years until they have reached six or seven.
- A preliminary phase is vitally important in any study. During this period the team has the opportunity to study its target population and work out their basic methods.
- The team must evolve suitable methods of measuring the state of nutrition, mental development, and socio-cultural patterns of population groups and individuals.
- Studies must involve scientists from a variety of diverse disciplines, to integrate the biological and socio-logical aspects of the study harmoniously into a single working unit, as well as to add credibility to the results.

One such study, in its third year, is being run by a team under Dr. Cravioto's direction, in a village in northern Mexico. Although the inhabitants form a homogeneous community, there is sufficient variation in socio-economic conditions to give the team confidence that differences in nutritional status will be measurable.

Ten years of cross-sectional studies laid the ground for the effort, and the first year of the seven-year study proper formed the preliminary phase. During the second

year, which ended last January 31, the team selected 300 children born during the year. For the remaining five years of the study they will keep detailed records of every aspect of the lives of these children and their families—records of disease in the families, of the relationships between mothers and children, of psychological tests, of family diets, and of every factor which shapes the total environment of the children in any way.

Avoiding the Clash of Cultures

Away from the scene of the action it is easy to talk analytically of underprivileged, malnourished populations, but the worker in the field must eventually face the problem of scientific detachment versus human involvement. Can one dispassionately compile statistics of human suffering without lending a hand?

In a way the solution is an easy one: the food is not available to give. The study groups can only offer advice on how to eke out the food available more profitably. The attitude of Dr. Cravioto's team is probably typical. They will willingly offer advice to anyone who asks them for it; such advice consists of planning a suitable diet for all the family on the basis of the family's budget. Already they have found that it is only the most forward-looking members of the community—the innovators—who come to them. The remainder appear to be unaware of their need—or perhaps insist on waiting for proof that the advice will produce results.

This observation poses another problem. How far should scientists impose their own scientific ideas, derived from alien cultures, on communities which have adapted to near-starvation and treat it as a basic fact of life? In introducing undernourished populations to such Western foods as dried milk powder we may be putting at risk the whole ecology of their existence. Dr. Thomson referred to a village in West Africa where dried milk is known as "the stuff which causes diarrhea"—it does just this because it is administered in unsanitary, filthy conditions.

However, the general picture is more encouraging than this example suggests. New high-protein foods, based on oilseeds such as soybean, peanuts, and cotton-seed are proving readily acceptable among undernourished populations. Fish protein concentrate will soon be available. Genetically improved varieties of corn and rice are now available, and work is in progress to improve surghu and wheat as well. Single-cell protein, produced from petroleum and natural gas as energy sources, is in prospect, and many synthetic nutrients are available.

The problem of world food shortage is, of course, far from solved. But the fact that scientists can now turn their attention to the health of the survivors of early malnutrition rather than spend their time predominantly in merely ensuring survival suggests that progress is being made. The field studies now under way should provide valuable understanding of the effects of malnutrition on learning and behavior. Hopefully, the application of science and technology to the solution of the world's food shortages will in time remove the problem altogether. ■

Computers and Management Automation

The new technology will not displace the manager; it will enlarge his skills and increase his influence

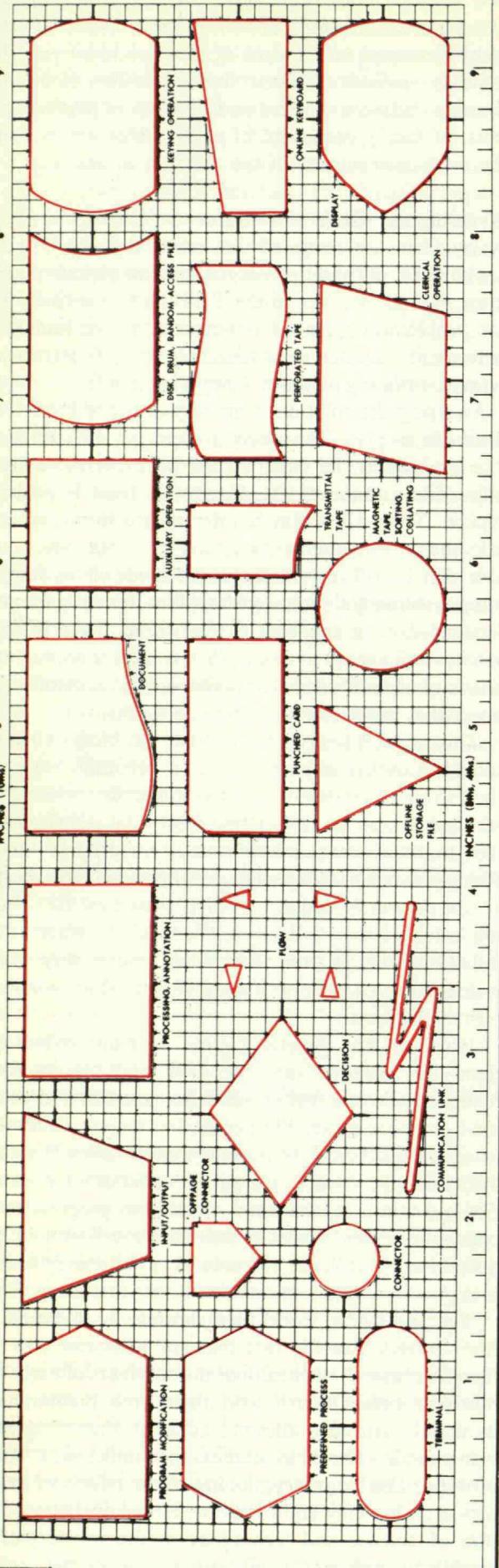
By Charles A. Myers

The computer revolution is a major technological change affecting management, and the fact that computer-based information technology affects management more than any other group is of particular significance. Now managers—frequently the initiators of change for others—are themselves affected by a major technological change, and it is certain that further changes are ahead.

The electronic computer is at the center of this new management information technology; it also includes a telecommunications network linking parts of the organization together through the computer center and a group of management science or quantitative techniques which depend upon the speed and capacity of electronic computers. Among these are linear programming, Bayesian decision analysis, and mathematical models for simulation purposes.

The central questions which this new technology raises for management are the following:

- Has the organization structure of management become more centralized than before? More decentralized? Some of both? What are the future possibilities, and their probable consequences?
- What are the implications for the rest of the organization in centralizing data processing and increasing the number of staff specialists?
- How has the nature of managers' jobs in different functional areas and at different levels changed as a consequence of computers? To what extent have managerial functions and responsibilities been replaced by computers? Will computers actually supplant and render obsolete the human manager?
- How have affected managers reacted to changes resulting from the new information technology, and what does experience suggest about effective implementation of such changes in organizations?
- What are the special consequences of computers for the personnel administration and industrial relations functions in organizations? What about the "systems approach" in personnel administration and the use of computers as an aid in collective bargaining?



Impact on the Organization Structure

An early and continuing view has been that organizations are becoming more centralized with computers. Thomas L. Whisler and his associates at the University of Chicago reach this conclusion in part through their studies of the increasing proportion of management compensation paid to the top levels of management after computerization. Others have pointed to the importance of systems concepts which interlock previously separate functional or product groups under a computerized management information and control system. It is also clear that there has been more centralization of certain functional groups in many companies, including accounting and payrolls, production scheduling and control, purchasing, inventory control, and customer ordering and shipping.

Despite all this evidence, a lingering doubt remains. What is seen as more centralization at one level in the organization may appear differently at another. If a large multi-plant company is able to combine several related plants under newly created divisional general managers, this will appear as more centralization to plant managers but very probably as more delegation and decentralization to the vice-president for manufacturing who formerly had all plant managers reporting directly to him. Life insurance companies are considering the possibility of giving field offices more access to the central data file under a real-time system, so that they can more effectively serve their present and prospective customers. Is this more centralization, or more decentralization?

If central decision-rules are developed to provide field managers with guides for alternative decisions, in place of more detailed directives earlier to each of several functional managers in the field, is this more centralization, or do the field managers responsible for a larger job now have "more freedom" to decide when to use particular decision-rules in the light of local circumstances? In other words, are there "pattern recognition" problems in the field that may not have been anticipated at the center? These questions suggest the possibility that the answers are not all in, that quantitative measurement of what happens may be difficult.

Furthermore, computer technology and systems design do not necessarily breed more centralized organization structures. Indeed, it is my conclusion that the new information technology is often neutral and that management can use it to design more centralized structures or to strengthen an existing decentralized organization. If top management lacks confidence in the ability of decentralized managers to direct their efforts toward the achievement of organizational goals, then it will seek the closer control which computerized management information systems can provide. But it may also decide to provide profit-center managers with direct access to the computerized data bank, so that each manager can monitor the progress of his own organizational unit toward previously set targets.

Some companies have consciously designed a computerized management information system to provide

regular information in appropriate detail so that managers at each level may take corrective action toward achieving their targets before top management receives the less detailed information indicating that a problem may exist. The difference in timing and detail of information supplied was deliberately designed into the system to permit continued decentralization of responsibility at different organizational levels.

Who gets information and for what purpose is a managerial decision, reflecting differences in managerial philosophy. Managers who favor continuing some form of decentralized organization will probably find that time-sharing and real-time systems which permit access to the data bank by a number of simultaneous users are an important tool in maintaining effective decentralized administration.

Implications of Computer Centers

Data processing is, of necessity, a centralized function, although in large firms there may be several computer centers. (There is evidence that decentralized companies tend to have decentralized computer activities, even though the over-all computer management is centralized.) Because the management of computer systems is centralized, so is much of the expertise in the form of systems designers, analysts, programmers, and supporting staff. Organizationally, these are staff people, but their activities necessarily bring them to question existing methods of processing information and inevitably lead them to find ways of unifying and integrating separate functions through computerized systems. As a result many data processing directors probably regard themselves as agents for centralized change, as "ramrods"—in the words of one such man—whose task it is to force change upon established existing ways of doing things.

Not all systems designers are conscious of being agents for organizational change. Even though their work affects people in organizations, they are sometimes so much concerned with developing a system which will benefit programmers that they fail to meet the needs of the managers who must use it. In one company installing an integrated information system, a behavioral scientist has worked with the systems group to bring to their attention the organizational implications of the manager-computer interface.

Staff members of computer centers constitute an élite group, usually in short supply, working on what they consider especially challenging and interesting problems. They need the support of operating management for what they are trying to do; and too often they fail to have the understanding and co-operation of these managers because they have too little feeling for the managers' problems. The lack of effective communication and co-operation between managers and computer center staffs has handicapped progress in computer introductions, and it is a problem which illustrates very well a number of general problems in the management of change.

Will information technologists, systems designers and

those using computers in the new management science fields be the top managers of the future? Very probably some will. But more will remain as specialists; the continuing shortage of specialists denies them the opportunity to gain broader managerial experience. Future top managers will be those who know how to communicate with and use the new specialists as a part of their general managerial competence. These may well be younger men than those who formerly reached higher management responsibilities.

Changes in the Nature of Managerial Work

Some functional areas, such as accounting, production scheduling and control, and inventory control, have been directly affected by computers. These are operations and logistics functions which contain much that is repetitive, structured, and even routine. They are appropriate tasks for automation. As a result, managers of these functions in many firms have fewer people reporting to them, or at least their staffs have not expanded at the same rate as the total volume of work.

Since many of these functions are staffed in the middle management group, there have been predictions that managers of operations and logistics functions would be displaced by computers. So far, with some exceptions, the evidence does not seem to bear this out. One study of five insurance firms by George E. Delehanty, '62, showed that the greatest displacement resulting from computerization was at the lower clerical levels and that there were substantial percentage increases in the managerial specialists and junior officer groups—typically part of middle management. It is possible, of course, that some displaced middle managers have been transferred to other jobs prior to their retirement—a form of management featherbedding. At least one insurance company executive suggested that the middle management group might eventually shrink as those who retired were not replaced. This possibility obviously cannot be verified in the immediate future.

A more important question is: When computers relieve managers at all levels of routine and repetitive work, and this line is shifting as the technology improves, what will they do with their time? The answer seems to be that there will always be an area of managerial work which is ill-defined, ill-structured and non-repetitive, and that managers relieved of routine will have more time to deal with problems in which courage, perception, sensitivity and initiative will always be required. Good managers have relied on experience, insight, and judgment—on "heuristics" which cannot yet be programmed for a computer. And if some cognitive electronic problem solver is eventually developed for some of this, the boundary of a manager's job is likely to push outward, to encompass activities now not done because there is not enough time to do them.

Neither the definition nor the solution of problems is well-defined at the higher levels of management. Relations with some of the external environment of the firm, and with associates and subordinates within the firm, often depend on non-recorded information. Indeed, Jay

W. Forrester, '45, has asserted that about 90 per cent of what matters to the success of a business—and these are the decisions of higher management—lies outside the data-processing system. Almost surely, effective managers will not see computer systems as rigidly controlling them but instead as aids or extenders of management skills. Clearly, top managers will increasingly ask the computer for information, for answers to measurable "what if" questions, for simulations which may narrow the ultimate scope for managerial decisions, and for other planning purposes. But the man will remain in management, with comparative advantage over the machine. As one of my colleagues working with real-time, time-sharing computer systems has put it, "The larger and messier the problem, the more important it is for man and machine to co-operate instead of trying heuristically to program the whole decision."

Implementing the Changes of Computerization

As a major technological change affecting management, computerization surely involves the effective management of change. Almost every company has experienced problems with affected managers, and computer introductions do not always proceed as anticipated. It is surprising, therefore, that there is relatively little research on factors making for success (or lack of it) in specific cases.

One exception is the report of Edgar F. Huse, a behavioral scientist, on the introduction of an integrated manufacturing system in one division of a large manufacturing plant. In the first stages of the introduction, there was passivity on the part of operating managers, who assumed no responsibility for making the program work because it was not "their program." There was consequent lack of understanding of the system, then resistance compounded by misinformation. The fear of the loss of control was acute on the part of lower supervision, possibly with some reason, and there was concern that the reward system was not geared to the information system. The implementation timetable was not met, and then pressure was added for faster implementation—with predictable consequences.

In this situation and in similar cases, there was eventual recognition that the task of implementing a computerized system was a *joint* responsibility involving both the specialists and the affected operating managers. The communication problem required more time, and fears had to be recognized and dealt with patiently. A large life insurance company, which has gone far in computer introductions, developed a task force for each affected department, with line or operating managers loaned for up to two years to an EDP group assigned to work out a new system in that department. The managers took the time to understand systems design, and the systems analysts learned from the managers what was now being done and how it might be changed with computers.

These experiences suggest the following requirements for minimizing the implementation problems:

- A clear top management explanation of and support

for the computerization effort.

- The establishment of joint task forces made up of operating managers and systems analysts working together to develop a system which the operating people have to understand and use.
- The improvement of communication channels between levels of management as the implementation proceeds, as well as giving managerial support to those affected by the change.
- Provision for lateral transfers for those managers who do not seem to adapt to or co-operate with the new system.

Implications for Personnel Administration

The information storage and retrieval capacities of computers offer great advantages in large firms for the computerization of personnel records. These now include not only basic data about each employee but also his job history in the company, skills acquired before and during employment, and (possibly) appraisals by supervisors. When the centralized employee data bank is company-wide, different locations can utilize it to determine the availability of people with specialized qualifications for actual or anticipated manpower needs. When these data are related to manpower projections based on sales and production forecasts, additional specialized recruiting efforts may be suggested, or a need may be shown for specialized courses given within the company or outside. In addition, if the compensation of each employee is recorded, the computer can answer "what if" questions such as, What would be the increase in payroll costs if all wages and salaries were increased by ten cents an hour? or, What is the cost of an additional week of vacation given to employees with specified length of service with the company?

In a recent survey of 89 industrial firms Richard T. Bueschel found that only about one-fourth were using data processing broadly throughout the industrial relations area, and the current picture is one of "moderate use that lags behind other functional groups within the firm." This lag is paralleled in another sense by the reports that personnel managers have not generally been directly involved in the problems of the implementation of personnel changes resulting from computerization.

Surely this is an area where the special skills of personnel administrators can make a contribution to the implementation of change. Computers can release personnel staffs from the record keeping and data analysis tasks which now take so much time, giving them more time for the non-structured tasks, such as helping line managers with their personnel problems.

The use of computers in preparing for collective bargaining is even newer. Possibly some firms have used computerized employee records to calculate costs of alternative management proposals or union demands, but I am not aware that any have access to data banks containing information on what other firms have done in collective bargaining. But the Industrial Union Department of the AFL-CIO, in seeking to co-ordinate the activities of some 77 corporate or industry-wide bargain-

ing committees, is storing information on the various collective bargaining contracts, as well as on company characteristics, so that bargaining committees can have immediate access to data to assist them in more effective presentation of their bargaining demands.

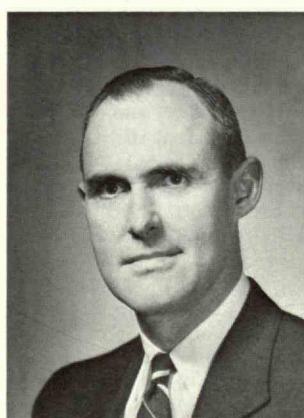
Nevertheless, the time is far distant when two computers, representing the company and the union, use the cognitive machine skills involved in playing chess to sharpen their bargaining strategies, draw on their own data banks, and come up with a collective bargaining contract that properly reflects superior bargaining strategy as well as grasp of the factual material. The new technology will enlarge the skills of the men at the bargaining table, but no one can imagine that it will replace them.

Conclusion: Top Management Remains in Control

Computers and the associated information technology of systems, telecommunication networks, and management science techniques have changed the structure of many organizational functions and may drastically change the entire organization structure. But the shape of future organizations may depend more on how top management uses the technology than on the technology itself.

Computerized management information systems can lead to more centralized organizations, or they can be designed to strengthen decentralization and to encourage managerial initiative and creativity. They can be seen as aids or extenders of management, reducing routine tasks and leaving more time for the ill-structured managerial tasks (including working with subordinates) which are now too often neglected. Or they can be viewed as imposing more controls, with the human consequences of resistance and loss of initiative.

Management cannot abdicate to systems designers decisions on the future shape of organizations or the application of computers to managerial work. Managerial leadership will be effective to the extent that managers take the time to understand the new information technology and to break down the barriers that now too often exist between them and the new specialists. In this process, the personnel and industrial relations staffs will benefit, too, from the new technology as they gain more time for the less structured tasks which are the essence of their staff functions. ■



Charles A. Myers has been a member of the M.I.T. Faculty since 1939 and head of the Industrial Relations Section since 1948; he is well known as a consultant in labor relations and personnel administration. This paper is based upon research by Professor Myers and others published this spring by The M.I.T. Press under the title *The Impact of Computers on Management* and summarized at the 1966 meeting of the Industrial Relations Research Association.

Trend of Affairs

Toxic Technology

Emilio Q. Daddario, chairman of the Science, Research and Development subcommittee of the House Committee on Science and Astronautics, has introduced a bill to create an independent Technology Assessment Board to identify possible dangers of new technology.

Representative Daddario admitted to *Science* magazine his doubts that the conception of a board is a practical means of achieving his end, but he is anxious that the proposal "stimulate discussion on ways of avoiding unwanted side effects of applied technology."

A different approach to the same problem is suggested by Arthur R. Kantrowitz, Visiting Institute Professor at M.I.T. who is director of the Avco Everett Research Laboratory: he wants to set up an Institution for Scientific Judgment. According to Boston *Globe* Science Editor Victor K. McElheny, it would be "a kind of scientific supreme court . . . a way of getting complex 'mixed decisions' involving science and other problems before the public."

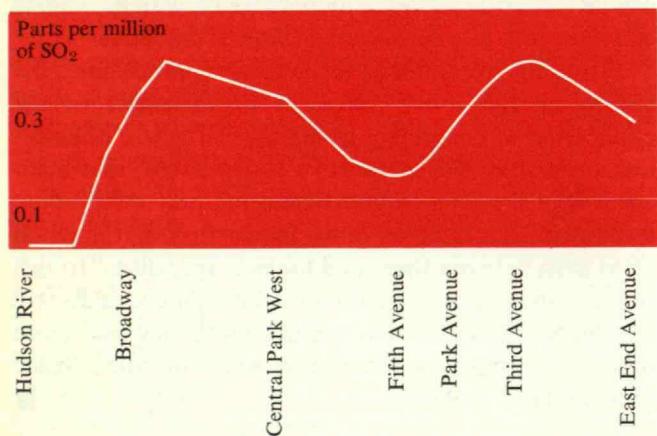
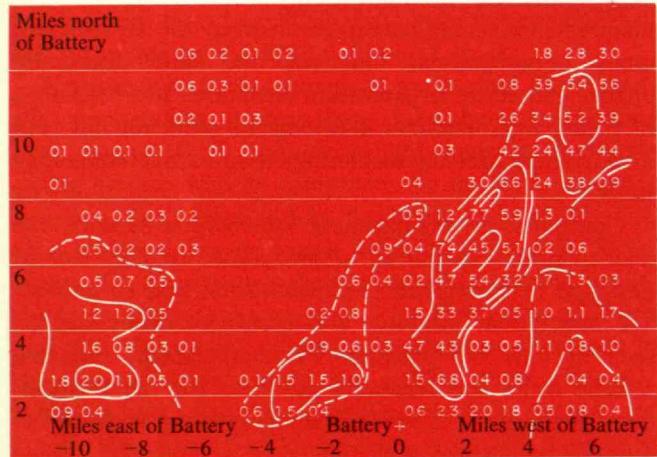
Meanwhile, Jerome B. Wiesner, M.I.T. Provost, expressed similar concerns opening an interdisciplinary seminar series at the Institute in April. There is evidence, he said, that our present trial-and-error processes are inadequate, that we "cannot permit totally anarchistic exploitation of every new idea," that we must somehow avoid "irreversible changes in society."

Whatever these views of the problem, they are surely not as radical as that of Wilbur H. Ferry of the Center for the Study of Democratic Institutions, who recently spoke on "Toxic Technology" to the Technology and Culture Seminar at M.I.T. "The regulation of technology is the most important intellectual and political task on the American agenda," he said.

Mr. Ferry's solution—about which he, too, has some uneasiness—is a Constitutional amendment to limit technology when it "can no longer help but only harm the human condition. . . .

"I can conceive of no way of effectively regulating and dispersing the power of technology other than by placing it under the Constitution," he said.

For emphasis, Mr. Ferry overstated his case: "In every collision so far between technology and human beings, people have come off second best . . . It is the priesthood (of scientists and technologists) that is more and more ruling the land and from whose ingenious devices and fateful decisions we must find a way to make effective appeal." □



It is no accident that the upper chart looks like a map of Manhattan Island and vicinity; it is a computer-generated "map" of the emission of sulfur-dioxide from space- and hot-water-heating in New York City, Jersey City, and Newark, in which the units are thousands of tons of SO₂ per square mile per year. The lower profile shows the SO₂ distribution in parts per million on a section from west to east through 79th Street (with a "valley" over Central Park) in the late afternoon on March 8, 1966. Both figures were shown by Benjamin Davidson, '51, Director of the New York University Geophysical Sciences Laboratory, in the first of a series of air pollution seminars at M.I.T. this spring. A Department of Health, Education and Welfare report published this spring suggests that human illness and death may begin to occur when the SO₂ concentration in the atmosphere averages 0.015 ppm over a year's time.

Communications and the Concept of Cities

Can current and future advances in communications technology solve the problems of today's cities? Indeed, will they make obsolete the very concept of the city?

These questions were asked by Paul Baran, of the RAND Corporation, and Martin Greenberger, Associate Professor of Management at M.I.T., at the recent annual meeting of the Institute of Electrical and Electronics Engineers in New York. Their answer to both was a cautious yes.

According to their paper, some observers consider the function of communication between people as the

single most important reason for cities to have come into being. But today, although people must be in close contact with colleagues and business contacts at work, many wish to move away from the crowded urban environment to live. Thus, although the number of city dwellers in the United States is still increasing, the number of inhabitants in the largest cities is beginning to decline, as their populations move out to the suburbs which appear more attractive.

Will information-based technology increase this trend? Dr. Baran outlined the two extreme positions on this question: the "far right" view is that the structure and nature of the city will remain very much as they are today, while the "far left" argues that computer-communication networks will allow people to transact almost all their business remotely and so make cities superfluous. Undoubtedly the truth lies somewhere between these extremes, but there is also no doubt that the development of time-sharing and person-to-computer terminals will enable people to stay apart if they choose to do so.

One very large barrier to this particular (for some) utopia is the need for a real atmosphere of personal contact in transactions brought about by electronic means; as Dr. Baran put it: "You want to feel that you are getting together with the other guy in your own room and closing the door."

The telephone falls far short of this eyeball-to-eyeball touch. Life-sized color television might provide the answer, however; the technological prospects of achieving this in the not too distant future are bright.

It would appear, then, that people will eventually be able to choose where they live purely on environmental criteria. Each household would be an island, with its own terminal in a vast multi-access system based on color television for contact with the outside world. In this way, the family unit might eventually regain the importance it lost through the migration to the cities sparked by the industrial revolution. □

Problems Computers Cannot Solve

While game-playing routines have been getting better and better, the use of machines for problem-solving where significance and relevance must be taken into account has run into unexpected difficulties. For example, fully automatic language translation has "fallen flat on its face," Hubert L. Dreyfus, Assistant Professor of Philosophy in the M.I.T. Department of Humanities, told a skeptical roomful of M.I.T. management students in a seminar this spring.

The distinction is significant. Game-playing programs use computers to deal with formalized systems, where the computer operates "in a completely circumscribed way." Language translation represents a problem which may be "non-formalizable and context-dependent in a very important way," said Dr. Dreyfus.

Dr. Dreyfus finds it surprising that checker players can articulate their rules well enough to develop good game-playing programs for computers, but he admits that they can do so. Writing a program for checkers is more than routine: "you've got to use more rules than simply the rules of the game," Dr. Dreyfus said; you have to program heuristics, to evaluate and eliminate from consideration some of the enormous number of alternative possibilities.

But language translation is very different, a good example of the difficulty of attempting to simulate human thought processes on a computer. It may be possible to develop a computer program to produce grammatical sentences but in understanding sentences already produced there remains a syntactic ambiguity about which of many possible grammatical rules was used in its production. Thus a given sentence can be parsed in many different ways.

A successful language translation program would also require rules for semantic disambiguation. Human readers disambiguate apparently without considering the various possible alternatives. If they are eliminating alternatives with unconscious heuristics, which is by no means obvious, they must have at their disposal in the process all their accumulated knowledge and experience. To accomplish the same thing with a computer you would have to store "all the knowledge there is." And even that might be inadequate, because sometimes it is not content but context which makes possible disambiguation by a human reader.

The pragmatic fact is that when people solve problems they often do so in the context of somewhat indeterminate goals, said Dr. Dreyfus. These goals determine what data are relevant and which transformations are significant. The machine's means-ends analysis does not work in the absence of a specific target, and the machine has no way to evaluate the significance of steps toward its end. The human's ability to relate means and ends is the missing element, Professor Dreyfus said. As a result, he concludes that the useful way to use a computer for problem solving is in close relationship with the human problem-solver, so that man-machine co-operation can be continuous throughout the development of the problem and its solution. □

Physics for America's Future

Several converging trends in the education of future physicists are about to meet, and if they continue America's scientific future may be in doubt, according to the 1966 manpower report of the American Institute of Physics.

The report makes its point by following the careers of 418,000 students who were enrolled in 12th grade physics in 1960-1961, six years ago.

Three years later, 7,500 of them were undergraduate physics majors; a year after that their ranks had thinned to 6,500, and only 5,500 received bachelor's degrees in 1965. These fledgling physicists then distributed themselves this way: 1,545 went to work (7 per cent for colleges, 14 per cent for high schools, 50 per cent in industry, and 16 per cent in government), 275 entered military service, 880 went on to graduate study in a field other than physics, and 2,800 started graduate work in physics.

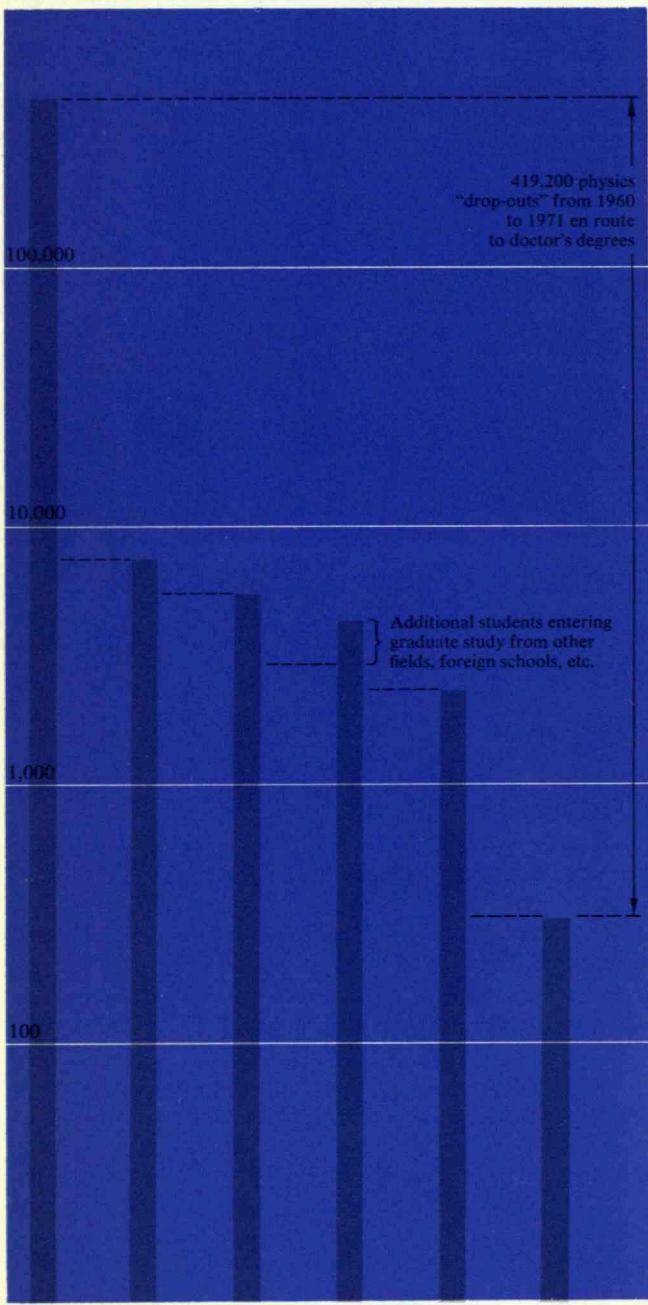
To the ranks of the graduate students starting graduate work in physics were added 700 with bachelor's degrees in other fields of science, 450 from foreign universities, and 350 whose physics bachelor's degrees had been awarded in earlier years, making a 1965-1966 total of 4,300. Of this number the AIP says 2,300 will receive master's degrees and 1,300 will (in 1971) receive physics doctorates. Then 56 per cent (about 700) will go to work for colleges and universities, but 92 per cent of them will start out working on research and de-

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velopment, only 7 per cent in teaching.

If present trends continue, there may be 25,000 physics graduate students in 1970; but there will not be enough teachers for them because drop-out rates are so high and because so few new physicists are joining the ranks of teachers. The number of undergraduate physics majors has been decreasing over the past five years; the number of physics bachelor's degrees reached a peak in 1962 and has since leveled off; and the number of physics graduate students has increased steadily.

M.I.T.'s experience in the same period has been essentially the same as the national survey reports for all American universities. Between 1960 and 1965 M.I.T.



1960-61 1963-64 1965 1965 1967 (est.) 1971 (est.)
 High school College Bachelor's First-year Master's Doctor's
 seniors junior-year degrees graduate degrees degrees
 studying physics in students in in
 physics majors physics in physics physics physics

granted an average of 32 physics doctorates each year—making it the nation's third-ranking producer of top-trained physicists. Larger than M.I.T. are Harvard and the University of California (Berkeley), graduating 48 and 47 respectively.

No one is very sure why the drop-out rates are so high, but observers are encouraged to find that the drop-out rate has been decreasing as the size of undergraduate physics classes has decreased since 1961; so the absolute number of bachelor's degrees in physics has remained nearly constant while the number of physics majors has declined.

Some of the reasons given by AIP's report, summarizing a survey of college physics department chairmen: the inadequacy of high school and college physics teaching; a growing interest in social problems, shifting students' interest to the humanities; extra academic work, longer years of preparation, and difficult courses required for physics majors; and the decrease in the number of high school students who can complete the relatively difficult physics curriculum developed by the Physical Science Study Committee. □

Urban Transport—Moving with the Times

Automated roads, dual-purpose automobiles and 10-passenger buses form the bases of a scheme for future urban transport, produced through the systems engineering approach. The plan is the result of an interdisciplinary student project, METRAN, undertaken last spring semester at M.I.T. and now published by the M.I.T. Press (\$7.50).

The student group was asked to design an "evolutionary, integrated urban transportation system to meet the projected changes in metropolitan development." The report emphasizes that this means simply bringing transport facilities up to a level which meets the users' expectations. And this implies removing such paradoxes as the fact that at 5:00 P.M. in the average city the man in the street can outwalk most vehicles.

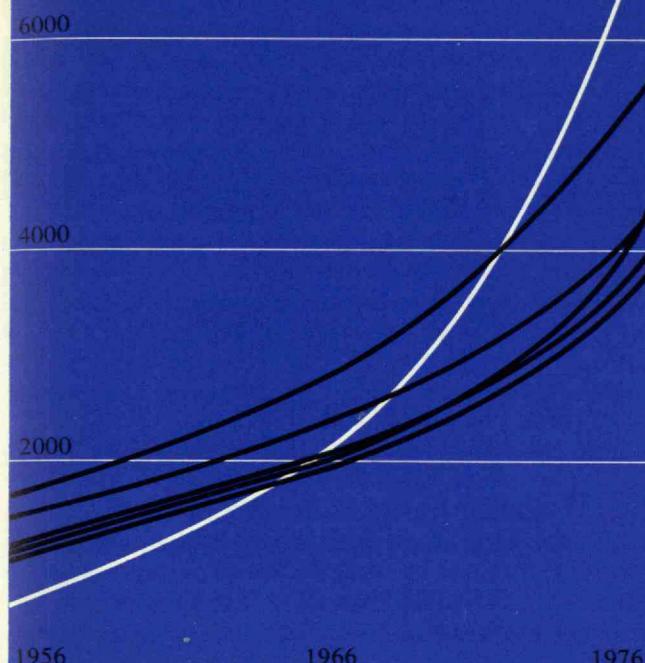
Project METRAN is aimed specifically at the Boston metropolitan region. However, various components of the system are applicable to any urban area.

The report proposes that by 1990 public transportation in suburban areas should rely on the so-called Genie system. This would consist of a fleet of small vehicles capable of transporting 10 passengers at a time and operating more like taxis than present-day buses. Instead of traveling on fixed schedules and routes, Genie vehicles would cover a zone one or two miles square, in which their movements would be directed by a central computer. Anyone desiring transport would dial through to this processor. Each vehicle would collect passengers until full and then take them to their destinations, or to suitable junctions at which they could change.

Automobiles and Genie vehicles would be able to travel on what the report calls a Guideway. Vehicles on the Guideway would receive power from a pick-up device, while a computer would direct each vehicle automatically to its passengers' destination. Once they leave the Guideways, automobiles would be powered by electric motors.

As to time scale, the report indicates that many of its ideas should become operational by the late 1970's. As a fairly immediate palliative to travelers, it suggests a system of bus-only streets, in which buses with multi-

Number of doctorate degrees awarded



door arrangements for rapid loading would have exclusive use of every third or fourth street in urban centers. □

Growing Despite Itself

Engineering is now America's fastest-growing field for advanced (post-baccalaureate) study (*chart above*).

By 1975, according to estimates of the U.S. Office of Education, engineering will be the most popular field for doctorates. In 1964-1965 it ranked third, behind the physical sciences and education; and 10 years ago engineering was at the very bottom of the list.

But the profession hasn't yet caught up with these changes. Joseph M. Pettit, Dean of the School of Engineering at Stanford University, last fall told the Pan American Congress on Engineering Education that the engineering profession as a whole is not really giving much encouragement to graduate-level work. Literature for prospective engineering students, he said, cites graduate work as being "of possible interest for someone going into teaching or research"; and most engineering students who have continued to graduate work made late decisions to do so—either during their senior years or after. Industrial employers, still chiefly concerned with recruiting undergraduates, generally "lament the diminishing numbers of good students to be found at the bachelor's level" without equating this with the far better candidates available at higher levels.

"Engineering education," he said, "is still perceived as basically undergraduate, in spite of the fact that individual students are discovering that they should go on to the graduate level."

M.I.T., having made a very early start in graduate engineering education, is the exception to this rule. Though graduate enrollment at the Institute has been increasing, the number of graduate degrees given each year in engineering has grown only modestly in the past

Engineering

Physical sciences

Arts and humanities

Education

Social sciences

Biological sciences

decade. The result is that M.I.T.'s commanding position as a producer of graduate-level engineers in the U.S. is no longer based on quantitative as well as qualitative evidence. □

Growing Institutional Grants

The Johnson Administration, in its determination to underpin the quality base of United States science, does not propose to underestimate the importance of research support for the individual investigator. The project-type grant, made on the basis of demonstrated merit of particular research, will continue to be the solid foundation that supports the structure of Federal science aid. But there will be modest increasing investments in so-called "programmatic" and "institutional" grants.

Spokesmen for Capitol Hill committees responsible for developing sound U.S. science and underwriting its costs, as well as managers of science programs in downtown Washington, report unanimously that there is no trend away from project-type grants. There are across-the-board increases for science support, and a somewhat larger fraction will be going for the more broadly based institutional grants which seem at the moment to enjoy an "in" status. That larger fraction is relatively small, however; it represents not more—and probably less—than 25 per cent of the estimated \$16 billion for all Federal support of R&D in the current fiscal year.

The displacement of project grants by institutional grants has been of concern in some quarters of the college-university community which have not been able adequately to support, out of their own resources, the research genius in their laboratories. Such concern for the individual investigator took a quantum-size jump when, a few months ago, the President admonished heads of science-oriented agencies and departments to

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take steps to spread Federal science aid more widely throughout the nation. Responding quickly to the White House suggestion, the Department of Defense established *Themis* (not an acronym, but the name of the Greek goddess of justice and law—simply an identification gimmick), capitalized this year for \$20 million and designed to broaden the base of DoD research and development support. Nearly 500 proposals were submitted to DoD before the February deadline from upwards of 200 educational institutions in all 50 states.

Talk with the men who direct the *Themis* program, however, and you quickly learn that theirs is not an institutional-grant enterprise. It is a modification of the project concept in which DoD seeks to support research carried forward in small centers of excellence, with a critical size of 8 to 10 faculty and 16 to 20 students who are pursuing lines of research important to DoD missions. *Themis* does, however, respond directly to the President's request by reaching widely across the nation to uncover untapped reservoirs of superior research.

The National Aeronautics and Space Administration claims considerable credit for initiating the institutional-type grant some five years ago when it first established its three-pronged, sustaining-university program with support for training, research and facilities. However, the segment of NASA support for so-called programmatic research—which, in some lexicons, might be defined as institutional—represented only 12 per cent of its total research outlay last fiscal year in areas of science and technology close to NASA's mission. The balance of its funding of research supported project-type investigations.

Regardless of first-in-the-field honors, all larger science-concerned agencies—DoD, NASA, Atomic Energy, National Institutes of Health, and National Science Foundation—distribute increasing amounts for institutions to use as they see fit to improve departmental research in areas of interest to grantors or (with reference notably to certain NSF grants for basic research) for improving the base of scientific research within the total university structure. It should be remembered, however, that although funds for such purposes are increasing, they are now, and probably will continue to be, relatively modest compared with funds available to support individual investigators.

Just beneath the surface of the premise that is used to justify the spread-the-science-support philosophy, a much sturdier political foundation is easily discernible. For it is not hard to demonstrate a benign relationship between the support of research designed to advance the nation's technological competence and the need of Senate and House members to justify themselves politically to their constituents. It works out, happily, that the institutional-type grant is good political as well as educational business. Obviously, a legislator gets more political mileage by announcing a \$250,000 institutional grant than by announcing a \$25,000 project grant to Freshwater U. Even though the substance of the project research is spelled out, nobody understands it; but the substance of Freshwater is right there for anyone to see who strolls across its campus. Furthermore, the chances

are good that Freshwater seldom, if ever, receives a project grant anyway. But when it has built up its research competence through the funds from the institutional grant, it will be in a far better position to compete with the big schools for project funds to keep its improved science out front.

The project versus institutional grant debate (if there is one) is only peripherally associated with the real controversy between defenders of support for known competence in big schools and supporters of potential competence in small schools. We will know more about the temperature of that debate when responsible House and Senate committees begin to consider science budgets for the several agencies involved. Representatives of mid-nation states and districts are again likely to look closely at agency plans for meeting needs of their constituent colleges and universities. They are less likely, however, to quibble over project versus institutional grants—they will be much more interested in answers to questions about *how much* than *how*.—Clyde C. Hall.

New Design for an Artificial Kidney

Three methods exist for taking over the function of an artificial kidney that has gone out of action: transplantation of another kidney, removing toxic products from the blood stream using an artificial kidney, and removing the toxic products at an earlier stage—from the extracellular fluid (peritoneal dialysis). To chemical engineers, the second method offers the greatest challenge, and in the first of a series of M.I.T. seminars on Engineering and Living Systems, Edward W. Merrill, '47, Professor of Chemical Engineering at M.I.T., highlighted an advance in the design of artificial kidneys which might eventually increase the availability of such units.

A major danger in current artificial kidneys arises from the need to prevent the blood passing through the artificial membrane from performing its natural function of clotting when it comes into contact with a foreign environment. Unless it contains an anticoagulant agent, the blood will be totally unable to pass through the artificial kidney.

The patient can take heparin, the anticoagulant agent, into his blood stream in two ways—either by a single injection immediately before dialysis, or by continuous introduction into the stream as it leaves his artery. In the latter case the heparin is neutralized in the blood returning to the patient by continuous "titration" with protamine, which forms a complex compound with it. But this complex tends to split up inside the patient's blood stream, and thus both methods leave heparin in the blood after dialysis.

With the inborn defense mechanism of clotting alleviated, the patient is vulnerable to any slight injury after dialysis. To reduce this vulnerability, patients with damaged kidneys are normally dialyzed just once a week. During the week's pause, however, toxic nitrogen compounds build up to high levels in the blood, causing imbalance among its constituents.

Ideally, doctors would like to dialyze kidney patients nightly, in sessions lasting about six hours. Professor Merrill's group has produced a design, and performed the basic chemical groundwork which promises to make this ideal possible.

The group has succeeded in coating cellulose, which

provides the membranes of artificial kidneys, and cellulose acetate, which transports the blood to and from the membrane, with heparin. They used the reaction between cellulose and ethylene imine; this produces amino-ethyl groups at the surface of the cellulose, which bind the heparin irreversibly to it.

The group's design for an improved artificial kidney incorporates coated cellulose and cellulose acetate into a unit through which blood can flow in continual contact with heparin. Under these conditions no clotting can occur inside the unit, and the dialyzed patient need have no fear of retaining heparin in his blood stream.

Two groups are due to start testing the unit with dogs in the near future—at the Massachusetts General Hospital, led by Dr. W. Gerald Austen, '51, and at the Beth Israel Hospital, led by Dr. Edwin Salzman. Professor Merrill's group is meanwhile continuing work on it, aimed at coating rubber with heparin, for joints in the unit.

If the unit proves successful, it will make daily, or nightly, runs possible. The consequent reduction in the amount of blood to be dialyzed will also remove the need for blood donors in constant attendance, for the patient will be able to supply enough blood himself to start the process of dialysis.

Assuming that the design successfully comes through its tests, Professor Merrill told Technology Review, it could probably be mass produced to sell more cheaply than current units. Eventually, therefore, artificial kidneys may become available to all patients who need them. □

Computers and Society's Future

Computers soon will extend the power, skill and precision of our minds in the same way as power tools extend the power of our muscles today. But computers may also impose uniformity and impersonality on mankind. The direction they actually take will depend on our wisdom in applying them to everyday problems.

This was the warning of Robert M. Fano, '41, Ford Professor of Engineering at M.I.T. and Head of Project MAC, at the recent convention of the Institute of Electrical and Electronics Engineers in New York. The great effects which computers will undoubtedly have on society, Professor Fano told the IEEE members, could be tremendously beneficial, or could hasten us into the era of 1984.

The M.I.T. time-sharing system, which includes two identical computer installations—at the Computer Center and at Project MAC—is one of the harbingers of the age when computers will be part of everyday life. And it will soon be technically possible to develop a network of systems more powerful than this system, which itself contains 160 teletypewriter terminals. Experience with the system has pointed to the paramount needs for any computer system available to the public:

- Easy accessibility to people.
- Accessibility to many users.
- High information storage capacity.
- Inbuilt privacy for individual users' programs.
- Possibility of making programs and data easily accessible to others if individuals agree.

As intellectual aids, computers will be able to improve the operation of society by increasing the complexity of the problems we can handle. They can assist partic-

$$(E1) \quad R_s(\omega) = \frac{2 \cdot 1}{\pi} \cdot \frac{\log \omega}{(a+1)} + \frac{2 \cdot a \cdot \omega}{\pi \cdot (\log \omega)} \cdot \int_0^\infty \theta_i(t) \cdot M_{n,i}(\omega \cdot t) dt$$

$$(E2) \quad 0 \left\{ \sum_{i=1}^{n-2} |\theta_{i+1}| \cdot \frac{[(n-v) \cdot (P_{n-i-1} - P_{n-i}) + P_{n-i}] \cdot \log(v+2) \cdot \theta_{i+1}}{(v+1)^i \cdot (n-v)} \right\}$$

PHOTO: DR. WILLIAM A. MARTIN

Mathematics by computer. A program written by William A. Martin, '61, and Joel Moses of Project MAC enables the computer to perform calculus. This is an example of the computer's ability to deal with the complexity of ever-increasing knowledge: the programmer need only know the basic theory of calculus instead of remembering the solutions for every possible calculation.

ularly in dealing with three forms of complexity—structural complexity, informational complexity, and the complexity of ever-expanding knowledge. Structural complexity occurs when a number of courses of action present themselves; by doing the tedious (although very intricate) groundwork, the computer can aid the decision-making. A typical informationally complex problem occurs when, for example, a student wishes to explore alternative educational plans. A computer program can enable him to do this and to store his final decisions. In the sphere of increasing knowledge, computers can store knowledge which need not be learned in detail to be used effectively (*see photo above*).

Today we are close enough to the widespread use of computers on everyday problems to consider seriously the social and political issues such usage will raise. As Professor Fano concluded, "The underlying issues deserve prompt and thoughtful consideration; the structure and mode of usage of the first systems may create tenacious precedents and industrial and commercial patterns which would be very difficult to alter later on." □

Engineering our Personalities

Electronic technology has brought man to the brink of a new, and to some very disturbing, discipline—"personality engineering." This was the message of a session at the recent meeting of the Institute of Electrical and Electronics Engineers entitled "The Design of Man ➤ Man's Design."

Two of the speakers dealt with the possibility of adjusting personalities, and a third related a jump forward in understanding how the human brain codes its visual inputs from the outside world. All three papers implied that man is on the verge of using his own intelligence to supplement his "natural" design.

Dr. F. Eugene Yates, of Stanford University School of Medicine, admitted that his paper on the control of endocrine systems was somewhat speculative. He believes that the coupling revealed experimentally between the endocrine and neural systems—the systems responsible for information transmission by chemical and electrical means respectively in man and animals—suggests a means to alter permanently the design of the

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central nervous system.

As evidence of the strong coupling between the body's two information transmitters, Dr. Yates cited three examples—the existence of certain chemicals which have both hormonal and neurotransmitter functions; the effect of hormones on the electrical activity of some parts of the brain; and experiments on the effects of a single exposure of sex hormone to the central nervous systems of new-born animals. Introducing hormones of the opposite sex to animals castrated just after birth permanently affects the sexual behavior of these animals: castrated females exposed to male sex hormone develop male behavior instead of the female ovarian cycle, while an ovary transplanted into a castrated male soon after birth shows cyclic female behavior. It is clear that the brain is not differentiated sexually at birth, and since just one exposure is necessary to produce permanent changes in behavior, scientists have an excellent lever for altering personality.

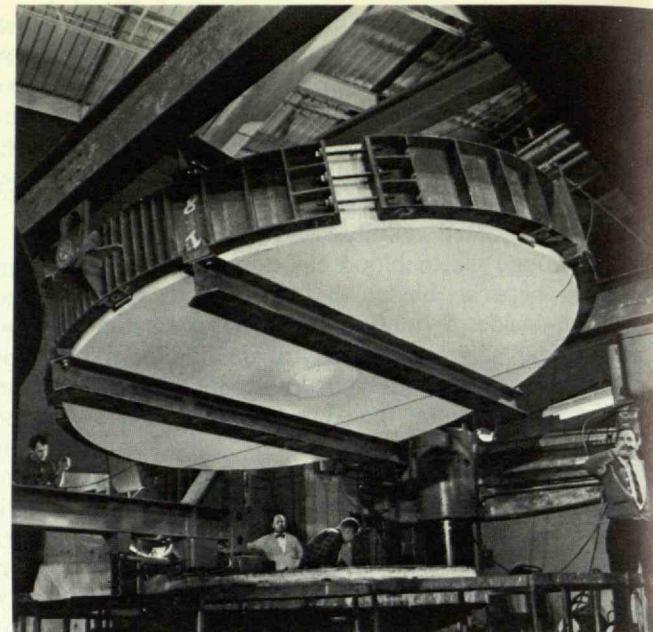
J. M. R. Delgado, of Yale University, dealt more specifically with present experiments in human engineering, using electronic methods. Professor Delgado's group has been studying colonies of monkeys, whose brains they stimulate by radio: electrodes implanted into the monkeys' brains are connected to radio receivers on their backs, which allow them almost complete freedom of movement. Suitable stimulation can alter the patterns of aggressive behavior, awareness of the outside world, friendliness, and even the maternal instinct of the monkeys. Similar tests with human mental patients have spectacularly alleviated aggressive behavior.

Professor Delgado called on the electronic engineers to develop miniature instruments which, implanted in the brain, could act as transceivers, relaying electrical information about the brain and receiving suitable stimulation. He envisaged permanent implants of this nature both in animals and men.

The third foray into the inner mechanism of the brain was reported by Dr. Manfred Clynes, of Rockland State Hospital, Orangeburg, N.Y. He and his co-workers have programmed a digital computer to identify over 100 visual stimuli—such as color changes and presentations of shapes and lines—from the electrical responses that they provoke in the human brain.

Individual responses by the brain to events, as measured by electroencephalograms, contain very little meaningful information. However, when the responses are summed and displayed by a digital computer, a consistent visual pattern emerges—a pattern whose sequence of components does not differ between individuals. This information enabled the group to program their computer to identify the visual stimulus correctly merely by summing a human brain's responses to the stimulus.

Now that biomedical engineers are thus far along the path to understanding personality, they must face the problem of controlling these abilities. Undoubtedly they will be of value in treating mental patients, but they have many sinister overtones. Professor Delgado referred to one experiment in which the members of a group of monkeys could decrease the aggressiveness of the leader by pressing a lever, which stimulated his



Engineering on the large scale: a 144-inch diameter mirror blank of fused silica is lifted off the grinding table at the Corning Glass Works plant in Bradford, Pa. The largest piece of fused silica ever fabricated, the blank will serve as the primary optical element for the European Southern Observatory's telescope to be erected on the mountain of La Silla, Chile.

brain by radio. "Can we create or demote dictators by direct stimulation of the brain?" Professor Delgado asked.

Dr. Nathan S. Kline, Director of Research at Rockland State Hospital, hinted at the need for control in the final paper of the session: ". . . since it will become increasingly easier to 'change human nature' we must face the question of who shall have the power to make such decisions and by what criteria." He proposed that ". . . enhancement of human qualities such as creativity, empathy, individuality, curiosity, self-awareness, and altruism be our objective in this reorganization of the organism."

The question of who should make the decisions remained unanswered; but does it not call for a reply even more urgently than that of criteria? □

Canada: How Much for Science?

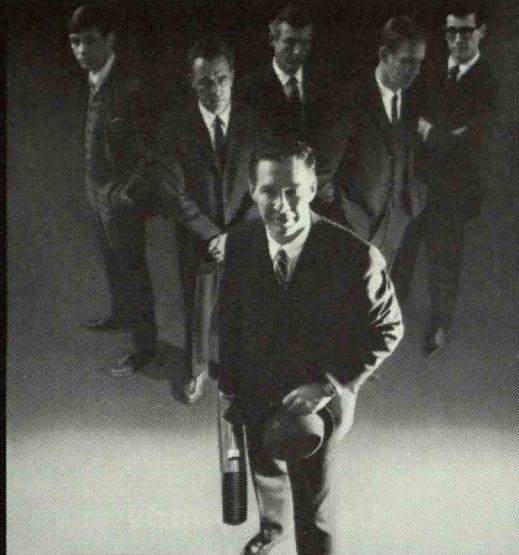
Canada has joined the ranks of developed countries in which government seeks independent advice on long-range scientific policy.

The United Kingdom was first on the list in 1949 with the Advisory Council on Scientific Policy. The United States joined the club in 1957 with the President's Science Advisory Committee.

Canada's entry is the Science Council of Canada, named last May 27 with Dr. Ormond M. Solandt as chairman and Dr. Roger Gaudry as vice-chairman.

With more than a score of members drawn from industry, universities and government, including the National Research Council's president, the new body is "to assess Canada's scientific and technological resources, requirements and potentialities and to make recommendations" on them to the Prime Minister who will report to Parliament.

Unlike the NRC, the Defence Research Board and



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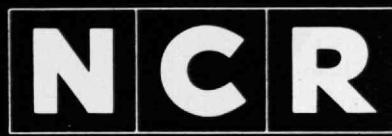
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other government agencies or departments, which hand out grants for research or actually do the work themselves, the role of the Science Council is exclusively advisory, with stress on recommendations for policies and plans for the future.

Its professional and administrative support is drawn from the Science Secretariat of the Privy Council Office, set up a little earlier to help the Prime Minister on science policy and now sharply increased in personnel.

The new Council's leadership is distinguished.

Dr. Solandt worked his way up rapidly through biology, medicine and physiology to operational research in Britain during the war, came back to Ottawa to help plan the Defence Board and become its first chairman in 1947. He is chancellor of the University of Toronto, vice-chairman of the Electric Reduction Company of Canada, Limited, a governor of the Arctic Institute of North America and trustee of The Mitre Corporation, Bedford, Mass.

Dr. Gaudry, first lay Rector of the University of Montreal, was a Rhodes Scholar and did research at Oxford just before the war, obtaining his doctor of science degree from Laval University, Quebec. For nearly a decade he directed research for the Montreal drug manufacturers, Ayerst, McKenna and Harrison.

In the House of Commons last April, Industry Minister C. M. Drury said the Council would devote itself to "the so-called natural sciences and not to social

sciences."

There was some muttering among social scientists, and when Prime Minister Pearson spoke at the inaugural Council meeting in July he said he felt "very keenly that the study of science's relationship to society should by no means be the sole province of philosophers and political scientists.

"So I urge you to join with the humanists and others, who approach knowledge from a different direction, to ensure together that adequate bridges are established between our pure and applied natural sciences and our social sciences and humanities."

He said the meeting began "a new relationship between science and government." The NRC, established in 1916, had found it could "no longer objectively advise the government on the activities of the other parts of the scientific community."

Canada was investing a smaller proportion of national income in science and technology than most of the countries in the Atlantic Community and "we must do better."

In the last five years, the Federal government had tripled its support of research in the universities. "Is this rate of increase, or indeed this mechanism of research support, adequate for the 1960's and beyond?" he asked the Council.

This could be interpreted as a discreet door ajar for a switch of government support from basic research to industrial R&D, and it could be that the Council will make recommendations in that direction—when it has completed a careful survey of present facilities and future needs.

In the House debate on the Council last spring, a so-

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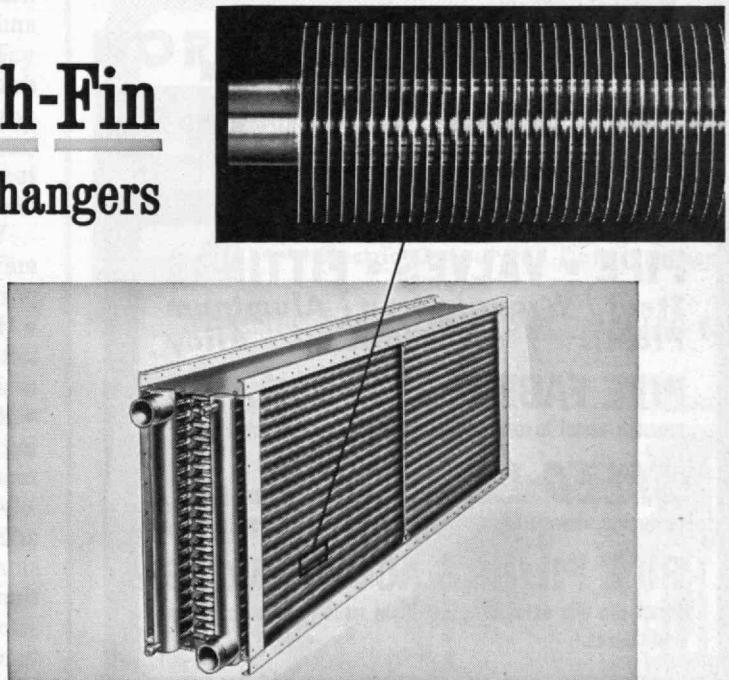
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Trend of Affairs

cialist member complained that Canada has only two industrial research associations, both devoid of government support, while Sweden has 27 with the government picking up 20 per cent of the tab.

In February this year, it was reported that the Engineering Institute of Canada was planning a brief to the Science Council calling for a shift in emphasis in Canada from pure research to industrial development.

The Institute apparently complains that Canada is falling behind both the U.S. and Sweden in productivity and rate of growth for these four reasons:

- Too little industrial and government expenditures on research.
- Too much of these limited funds allocated to basic research.
- Too high a proportion of the research dollar being spent by government intramurally or within government agencies.
- Too little understanding in Canada of the need for research spending to pay off in results of socioeconomic consequence.

The brief is reported to recommend that national research and development investment should be guided into a distribution of 10 per cent for basic research, 30 per cent for applied research, and 60 per cent for development research.

It says Canada is now spending more than 16 per cent of its research and development funds for pure research. More than 20 per cent of government expenditures went to basic research, 54 per cent to applied research, and about 25 per cent to development.

There is some indication that the brief may be withdrawn for revision of figures.—*Fred Poland*.

Success Breeds Success

Is it really easier to start a research-oriented business in one community than in another?

Yes. Two factors contribute to the difference, and they may be self-generating, according to a recent survey reported by the Federal Reserve Bank of Boston:

- How sophisticated are the sources of seed money, the initial capital needed by a science-based business to make its start?
- How effective are the area's universities at developing graduates who are interested in the "innovation" market?

An interview survey of executives in Boston and Philadelphia is the basis for the Federal Reserve's conclusions. Managers in both cities were asked two questions: Do universities play any role in stimulating new science-based firms? and What is the attitude of local banks to financing for the small, science-based firm? Philadelphia came off second-best to Boston on both questions.

Risk capital, says the Federal Reserve survey, is less difficult to obtain if financiers are scientifically sophisticated. Boston bankers, experienced in the needs of new science-based enterprise, are convinced that "a high proportion of new jobs in the next 10 years will be in industries growing out of current research and development," says the report. Philadelphia bankers seem neither as

sophisticated in scientific affairs nor as convinced of their importance.

And founders of science-based firms "strongly believe" that local universities are vital; Boston-area heads think their area's graduate schools play a "fundamental role" in the growth of the region's R&D companies. This is because of the direct "spin-offs" from university activities, because universities are magnets to attract talented workers for continuing education, because they provide a source of special consultants, and because people tend to settle down after graduation and go into business in the communities they have come to know as students.

As a result, high-growth-potential R&D companies are settling down in Boston, and the Boston scientific community is assuming a character very different from that of Philadelphia, says the Federal Reserve study. Though their numbers are about the same, Boston employs more scientists "with a higher degree of educational attainment" than those in Philadelphia. There are more engineers in Philadelphia than Boston, but in Philadelphia they are engaged more heavily in production, sales and marketing. Boston engineers tend to work more directly in research and its management—an area which is a basic source of new ideas which lead to more new companies.

Success breeds success. Now Boston has the reputation of being a good place to start a new science-based firm, concludes the Federal Reserve study. "Whether this attitude is based on myth or reality, the image itself can be the determining factor in the birth of more new companies in the area." □

Science and the City

What really must be done to make modern cities work for man instead of against him?

When engineers tackle a complex, tough problem, they use "systems" techniques, breaking the big problem down into lots of little ones and then bringing all the answers back together again. Can these techniques, which have put man into space and helped him erect great buildings, also solve the multitude of problems in his cities?

"Science and the City," a new report from the Department of Housing and Urban Development (U.S. Government Printing Office, 45¢), proposes just such a comprehensive "systems" approach to applying scientific and technological achievement to urban problems. The booklet is a summary of a 1966 summer study sponsored by the Department of Housing and Urban Development. The study chairman was Walter A. Rosenblith, Professor of Communications Biophysics at M.I.T.; and the report is by Volta W. Torrey of NASA, former Editor of Technology Review.

Other members of the M.I.T. community who participated in the summer study included Robert C. Wood, Under Secretary of HUD, who is on leave from the M.I.T. Faculty; Dwight M. B. Baumann, '57, Associate Professor of Mechanical Engineering; Richard S. Bolan, '56, of the Harvard-M.I.T. Joint Center for Urban Studies; Gordon S. Brown, '31, Dean of the School of Engineering; Richard L. deNeufville, '60, Assistant Professor of Civil Engineering; Ezra D. Ehrenkrantz, '54, of Building Systems Development, Inc.; William L. Hooper, '57, of the Office of Science and Technology; A. Scheffer Lang, '49, of the Department of Commerce;

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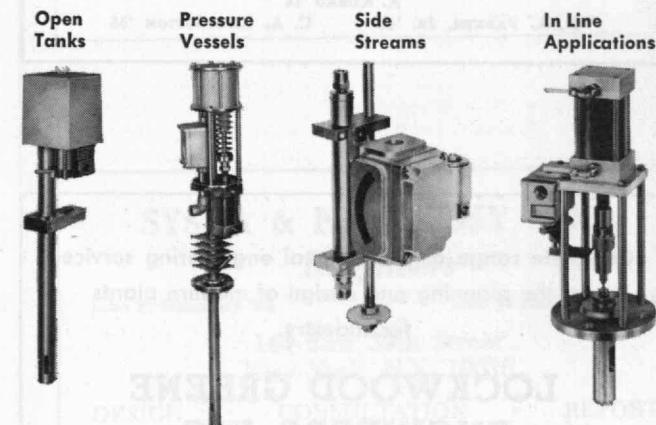
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Trend of Affairs

Sumner Myers, '48, of the National Planning Association; Jack P. Ruina, M.I.T. Vice-president for Special Laboratories; Harry M. Weese, '38, of Harry M. Weese Associates; Terry Vander Werff, '66, an M.I.T. graduate student; and Carroll L. Wilson, '32, Professor of Management at M.I.T.

"Creating a safe, happy city is a greater challenge than a trip to the moon because urban housing is more complex than a rocket and the city is subject to more perturbations than the moon," Mr. Torrey writes in the HUD report. "Nevertheless," he says, "its everchanging problems can be attacked in the same logical way we have gone about exploring the universe."

The Woods Hole study concentrated on five urban systems and sub-systems: health, transportation, housing, environment, and rehabilitation. The conferees divided themselves into groups, each to work on one of these systems; then they reassembled to report their recommendations, and each in turn listed large but not insurmountable problems to which new research should be devoted.

The panel studying health services called for changes in organization and application so that what we already know about human health may come to benefit all those living in cities. The use of management science and computer technology is an important possibility: the "greatest lag in the health field has to do with the organization and delivery of health services," said the panel. And there must be a co-ordinated management which will bring together into an effective partnership all the city, county, state, and Federal resources which are now providing piecemeal health services.

Transportation presents the most obvious technological challenge: Can we replace private automobiles with computer-programmed busses? Can we devote certain streets in our cities to high-density transportation in rush hours? Can we design cities so that people have less need for transportation? Two parallel research undertakings were recommended to determine transportation requirements and to develop systems to fulfill them.

Housing is another of the fruitful areas for new research. The housing subcommittee agreed that nontechnical constraints—codes, labor practices, and human habit—were serious problems, but they concentrated their attack on new technological requirements: new housing concepts, new production systems, more intensive land use consistent with greater privacy, studies of the optimal size and spacing of enclaves of housing within a city.

The environment study reviewed needs in the fields of water supply, sanitation, storm drainage, waste disposal, air pollution, and utility distribution. It found scores of imaginative ideas in technology but little evidence that they had been taken seriously enough.

Rehabilitation, too, will benefit from a systems approach which brings together all kinds of now unrelated effort. A quasi-public "corporation for housing" was proposed to create the mass markets and large scale which could bring forth technological innovations now impossible. Carpenters, plumbers, heating experts, masons—no one group can now "go critical."

Men will reach the moon, says "Science and the City," because we know the hazards and have launched a national program to reduce them and to achieve our purpose. But men's fear of change is "a basic reason for the high cost of urban living." Fear of the future underlies the craftsman's opposition to mechanization, the conservatism of real estate investors, our unwillingness to change our antiquated codes. Cities, said Donald F. Hornig, Presidential science adviser who reviewed their work with members of the summer study, need the same bold approach, the "same kind of systematic experimentation, systematic innovation, and the bringing together of large bodies of diverse talents" which have made possible America's successes in space. □

Achievement and the Need to Achieve

No one is surprised to learn that the psychological makeup of the executive says a good deal about the success of his firm—assuming that the enterprise is small enough for the one executive's needs and aptitudes to make a significant difference in terms of company performance.

Now the results are specific in the case of a few of the many psychological characteristics of the chief executives of a very small sample of small companies. The data are from a preliminary report of research by Herbert A. Wainer, '65, and Irwin M. Rubin, '63, of the Sloan School of Management.

They made the assumption that the chief executive of a small company is "in a situation where his need for achievement, if it exists, can be readily translated into concrete behavior. It is his personality and motivation that molds the company in its every aspect," they say. With this background, they made a study to correlate company performance with need-for-power and need-for-achievement—psychological variables for which reliable tests are available.

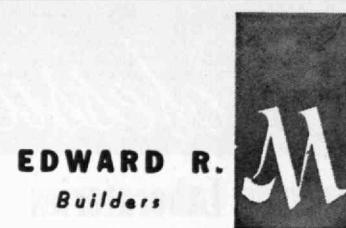
The results suggest that need-for-achievement and need-for-power on the part of its chief executive are together the determinants of small company performance in the following manner: "High need-for-achievement and moderate need-for-power are associated with high performance. High need-for-achievement is a necessary condition for high performance, whereas moderate need-for-power seems to make high performance more probable. Moderate and low levels of need-for-achievement are associated with lower levels of performance, the order of association being determined by the level of need-for-power."

"High need-for-power appears to be indicative of an authoritarian and low need-for-power indicative of a laissez-faire style of leadership. On the other hand, moderate need-for-power seems to be indicative of a democratic style of leadership."

"It is the interaction effects of several needs that seem to explain performance," conclude Mr. Wainer and Dr. Rubin (who is assistant professor of organizational psychology and management), "and the pattern of interaction observed is reasonable and consistent with established theory." □

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Trend of Affairs

more important than anything you can put in your bid or do to follow it up.

Two years ago Edward B. Roberts, '57, Associate Professor of Management at M.I.T., reached this conclusion in a study of 90 individual research and development contract awards. The contract winners were usually those companies that had made themselves known to the technical initiator of a Federal research and development procurement and so were listed near the top of his suggested source list.

Now he writes in a new "working paper" from the M.I.T. Sloan School of Management: "We have found the same kind of conclusion in looking at companies as a whole in terms of the aggregate of their new business activities. The high-performing companies are significantly different from the low-performing companies principally in what they do and what they know before they receive formal requests for R&D proposals."

Yet, says Professor Roberts, "although we now have so much evidence gathered in so many different ways that suggest strength and importance of contact orientation, we cannot find a single company that exhibits that kind of an orientation consistently in all of the competitions in which it engages."

Professor Roberts makes five suggestions for improving research and development marketing effectiveness:

- Spend more time on self-analysis of marketing procedures and effectiveness. "He who doesn't study history is doomed to repeat it."
- Make realistic self-studies and rational decisions on whether or not to bid on R&D proposals. "I know about 'attempting to gain exposure to a government agency'; I know about 'buying a ticket to get in to talk to the initiators later'; and the many other reasons companies give for bidding jobs they have little chance of winning. It is still my conviction that more rationality must be applied to the bid/no-bid decision-making area."
- Develop clear-cut objectives and plans against which to make integrated decisions on funding and bidding. These plans and objectives should cover company-sponsored and government-sponsored in-house R&D as well as proposal activities.
- Get in on the ground floor of R&D decision-making. "All our evidence proves clearly the need for far more concentration on the early phases of R&D competition, what we might even call the pre-competition phase."
- Provide better in-house information systems adequately to assemble and use the facts and ideas generated in day-to-day business operations which bear on marketing strength. Recall, evaluation, and analysis capabilities are needed for "truly effective marketing analysis information systems aimed at management decision-making."
- Engineers, who make many key marketing-oriented decisions, in particular should "get the message." Even more than marketing people, engineers "need to be educated in these insights into the determinants of research and development awards and R&D marketing effectiveness" so that they can, at least some of the time, "think like marketing men!" ■

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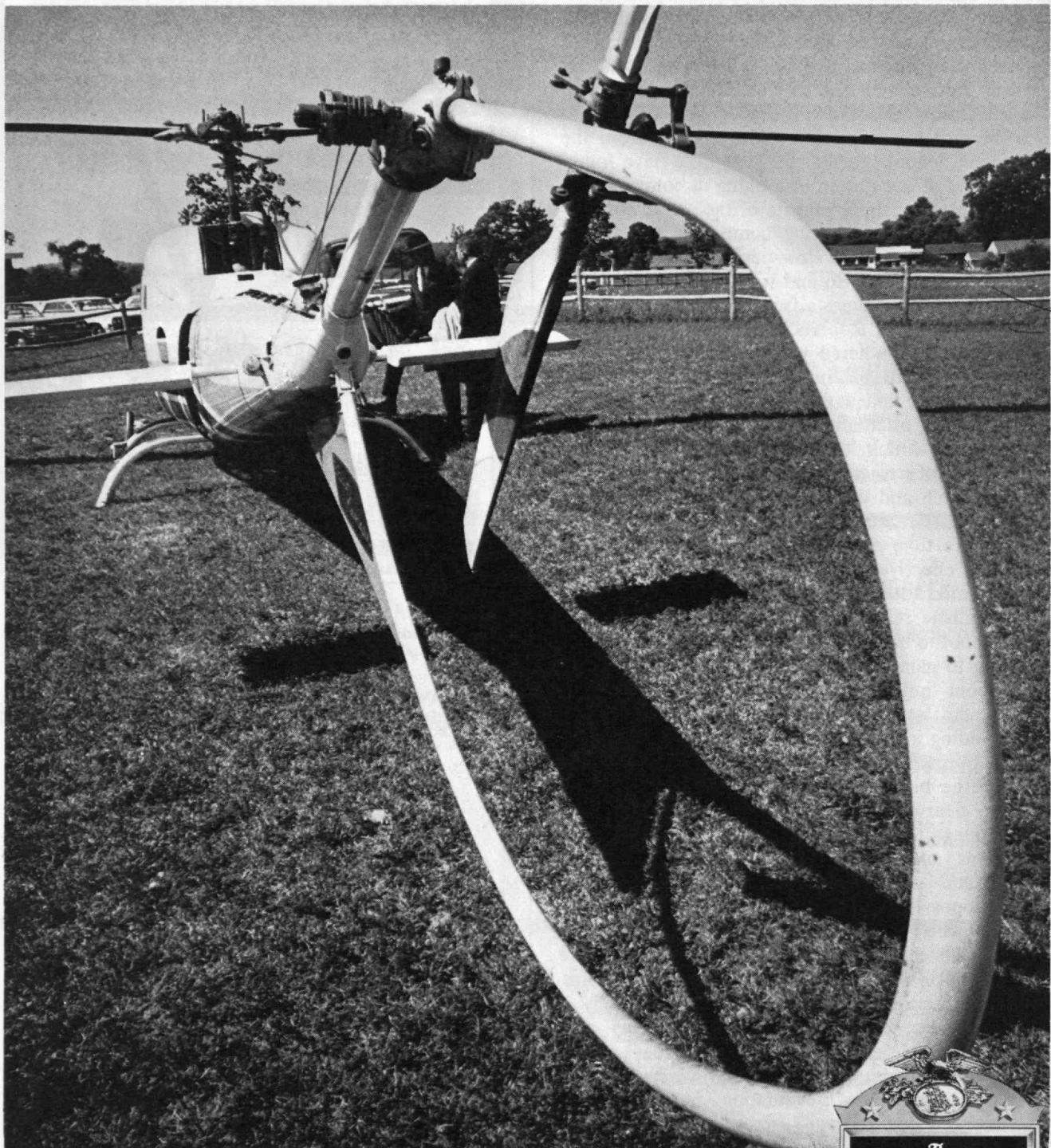
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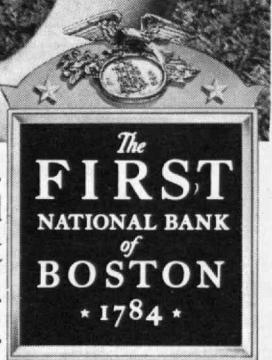
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An Institute Gazette

"Fantastic Freedom"

When H. Robert Horvitz, '68, a mathematics major from Skokie, Ill., walked into the Student Center after dinner on February 28 he was one of the last present to learn that he was the new head of a \$300,000 M.I.T. enterprise.

For the vote-counting was finished early, and candidate Horvitz had come out with a convincing margin of more than 600 votes in the annual election for President of the M.I.T. Undergraduate Association.

Any way it's measured, the UAP's job at M.I.T. is a big one. A month ago, when Technology Review interviewed Bob Horvitz about it, he admitted that "last night (Wednesday) was the first night I slept this week."

M.I.T. student government is a vast network of interlocking committees and boards through which all undergraduate classes, living groups, and activities find representation.

Through its committees on student environment, educational policy, foreign opportunities, and visual arts, student government works on common problems with comparable faculty committees. And its Judicial Committee takes on many cases which would otherwise go before M.I.T.'s Faculty Committee on Discipline.

The M.I.T. funds provided for student activities for 1967-68 may be as much as \$100,000. Admission fees and other income from student activities will mean that the Finance Committee

oversees a cash flow of about \$300,000 during the year.

Through the Activities Executive Board, student government tries to see that all extra-curricular affairs have responsible management and educational value.

At the apex of all this activity is Institute Committee, over which Bob Horvitz will preside for the next 11 months. "I am positive there is something for everyone in M.I.T. student activities," he says, "and we want to make sure everyone knows what is here."

What are the problems and challenges facing Bob Horvitz's student government? They are these, he thinks:

- Student government has "fantastic freedom" at M.I.T. to organize and manage student life, and we want to make sure that we use this freedom to give educational experience to as many students as possible. So Bob has spent long hours interviewing and recruiting capable students for the assignments he must fill to put the student government organization to work.
- We want to increase student involvement in faculty discussions of Institute affairs. "Faculty committees are making decisions which directly affect students. Shouldn't students be there, sitting in, to provide an input on these decisions?" asks Horvitz. For example, the students want to discuss with the faculty the question of how much educational pressure there should be at M.I.T., whether it's possible to increase student-faculty contact by holding some classes in the dormitories, whether "pass-fail" grading and "seminar-

H. Robert Horvitz, '68, new President of the M.I.T. Undergraduate Association, presides over the April meeting of Institute Committee flanked by some of his "cabinet": Alfred A. Singer, '68 (left), Chairman of the Activities Executive Board; Clyde E. Rettig, Jr., '68, Chairman of the Secretariat; Richard I. Karash, '68, Chairman of the Finance Board; Robert J. Condap, '68, President of the Class of 1968; and Alan J. Slobodnik, '69, President of Burton House.

PHOTO: OWEN D. FRANKEN, '68



Thirty-five of the 52 undergraduates who hold Alumni Fund National Scholarships were feted by members of the Alumni Fund Board and other officers of the Alumni Association at a reception before a recent meeting of the Alumni Council, at which the students were guests. Allocations from Alumni Fund contributions for undergraduate scholarship aid were \$49,125 this year.

type" classes should be extended.

- We want to increase contact between students in dormitories and those in fraternities, to improve freshman orientation by providing an alternative to "rush week" for those students who do not pledge fraternities and eventually live in the dormitories.
- We are trying to make better use of the already outgrown student-activity space in the Student Center building.
- Student government must plan for the regional conference of the Association of College Unions which will come to M.I.T. next year, and it is supervising preliminary plans for an intercollegiate conference proposed for next spring.
- We want to provide better orientation for foreign students coming to M.I.T., supplementing the Institute's "host family" program with a "big brother" program at the student level.
- We will soon be participating more fully in the scheduling of Kresge Auditorium, so that student affairs have priority in reservations for the hall.

Bob Horvitz says there is "fantastic potential" for student government at M.I.T., and the editors of *The Tech* give him a strong vote of confidence: "There is no reason to doubt that he will handle the job very effectively."



Ocean Engineering
A graduate program in ocean engineer-

An Institute Gazette



PHOTOS: OWEN D. FRANKEN, '68

Hard work was the order of the day for the pledges of two M.I.T. fraternities during this year's mid-term break. Alpha Epsilon Pi freshmen worked on their own house (left), while Alpha Tau Omega pledges donated their services for improvements at the Dorchester Settlement House (above).

ing—the new field that deals with man's exploration and exploitation of the seas (see Technology Review for March, 1967)—has been authorized for advanced degrees in the M.I.T. Department of Naval Architecture and Marine Engineering.

Alfred A. H. Keil, Head of the Department, says that the new program signals the start of a major expansion of M.I.T.'s work in naval architecture and marine engineering, which for several decades has been the nation's largest graduate program in the field.

Taken together with M.I.T.'s plans for a joint graduate program in oceanography with the Woods Hole Oceanographic Institution, this latest announcement gives evidence that M.I.T. intends to become a major factor in developing professional resources and technology to exploit the nation's untapped ocean.

Ocean engineering at M.I.T. will emphasize the principles governing the conception, design, construction and operation of vehicles and stationary floating structures and their role in the exploration and utilization of ocean resources, the conduct of oceanographic research, and the recovery of objects from the ocean floor.

It will deal, for example, says Professor Keil, with vehicles, stationary floating platforms and structures, support of ocean mining and oil drilling, engineering support for ocean fisheries, engineering aspects of ocean explorations, engineering aspects of oceanographical research, and support for ocean bottom stations.

"In ocean engineering we will involve graduate students in actual projects related to the development of ocean technology and applied oceanography," Dr. Keil says. "There are many such projects already under way and many more on the way. We also expect to work closely with Woods Hole in areas where our graduates can make use of their facilities and participate in their research projects."

The ocean engineering program will lead to the graduate degrees of master of science in ocean engineering, doctor of science (or philosophy) in ocean engineering, or to the professional degree of ocean engineer.

CEP and SCEP

Student participation and responsibility in the affairs of M.I.T. is a local tradition, taken for granted and highly acclaimed by students and faculty alike on the campus but little appreciated elsewhere. Now, although the areas and scope of student responsibilities

continue to increase, there are calls for still greater participation in Institute academic government by student representatives.

The Tech, in its lead editorial on March 17, agrees that there is "more and more student participation in policy decisions." Students meet with the Activities Development Board, the Athletic Board, the Committee on Environment, the Committee on Visual Arts, and the Committee on Discipline, and "other examples abound," writes *The Tech*. Howard W. Johnson, President of M.I.T., has told the Faculty that, "viewed against what seems to prevail across the country, we are doing well but want to do better."

The present point of contention is that students do not yet sit at official meetings of the all-important faculty Committee on Educational Policy. While *The Tech* agrees that the reasons advanced "were strong ones given the present state of affairs," its editors clearly hope for a change which will bring students into the CEP committee room as observers and consultants.

Already the CEP has an effective liaison with the Student Committee on Educational Policy, and the M.I.T. Faculty, according to Charles P. Kindleberger, its chairman, "is committed to interaction." He enthusiastically reports the contributions of the student committee so far this year: its recommendations to change the pre-exam week reading period, to test a "pass-fail" grading system, and to change some library policies have been studied and accepted by CEP.

The liaison between CEP and SCEP includes monthly luncheons with representatives of each group present and two dinners a year at which the faculty committee hosts the full student committee. The result, agrees *The Tech*, has been "a solid working relationship whereby information channels are kept open and members remain open-minded."

"But," its editors write, "the point at which a student can no longer be of any value in policy formation . . . has not yet been reached." There is need for "continuous feedback, for dialogue—not negotiation," according to a student memorandum; and most of all *The Tech* disputes vigorously the CEP's attitude that a student among them will hinder free discussion.

Professor Kindleberger, presumably on the basis of discussion in a recent faculty meeting, doubts that student observers will be permitted at CEP meetings. There are just "too many subjects before the committee in which student participation is inappropriate," he says.

"At one end of the spectrum there



PHOTOS: ARTHUR A. KALOTKIN, '68

The Tech on "Lucky William," the 1967 Tech Show (student-written and produced musical): "... a little bit of everything, fraught with significance and ambiguity . . . the story of a simple but virtuous and happy shepherd boy who sets off with Laurel, his childhood sweetheart, to seek their fortunes in the distant city and escape the boredom of the sheep's company . . . William has the laudable aim of killing an ogre, restoring the 'cup of life' to the wretched city . . . Laurel seeks only something more exciting than William."



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An Institute Gazette

are things before the CEP on which students have no basis for solid judgment, and at the other end of the spectrum there are things on which their opinions are worth a great deal," Professor Kindleberger points out. He believes the present close interrelationship is the best way to bring students into involvement on those issues on which they have great competence. He hopes especially that the two groups may this spring be able to work out a plan to extend student participation into the area of evaluating teachers and courses.

"Spasibo"

"Strasvetya" and won't you come visit 486 Beacon Street where 16 M.I.T. undergraduates and a tutor live speaking only Russian.

M.I.T. Russian House was started two years ago by a few enthusiastic students on the widely accepted theory that if English were prohibited, they would quickly learn the foreign tongue. It works—though progress is not as fast nor life as simple as in the German corridor in Burton House, whose tradition the Russian House follows.

The living pattern is not very different from other M.I.T. houses. Dinner is the only time when the entire group is together. Announcements begin the sit-down meal and then comes quick, animated conversation; this reporter could only judge from the laughter that it was understandable and amusing. The house cook prepares only American food.

Occasionally a visitor fluent in Russian appears at the dinner table. Last year a Russian technologist spent two days at the house explaining his country and helping with accents. The Russian speaking faculty members also dine with the boys.

Social occasions are limited since relatively few people have a working knowledge of Russian. However, several girls' schools in the area, including Radcliffe and Wellesley, have Slavic Societies and the girls are eager to use what they have learned at informal get-togethers in which a Russian atmosphere is simulated with a fireplace and good Russian drinks.

Overseeing (and overhearing) the center is Laurence H. Scott, who is working on his Ph.D. in Russian studies at Harvard.

None of the M.I.T. students has had more than five years of Russian and none of them is planning on a career where the language will be explicitly valuable. The reasons for living there usually include a concern with the

prominent role Russia plays in world politics. For Bradford Cross, '67, the house offers the opportunity of learning to converse in a language which is especially difficult to learn in the classroom without sacrificing other courses and laboratory work. (M.I.T. does not offer a Russian major and, in fact, offers courses which amount only to four consecutive years of study.) Freshman Robert Greer wanted to continue in the language after having three years of it at his high school.

To be accepted in the Russian House, an applicant must have studied the language for two years on the secondary level or one year at the college level and promise to speak only Russian while in the house. There are, of course, lapses, but they are relatively few, since the lazy ones will be severely admonished—in Russian—by a fellow student.

New Graduate Dean

Irwin W. Sizer, who has been head of the M.I.T. Department of Biology since 1957, will be Dean of the Graduate School beginning on July 1.

He will succeed Harold L. Hazen, '24, who has announced plans to retire.

Dr. Sizer came to M.I.T. in 1935 after work at Brown and Rutgers Universities. For a number of years he was in charge of the Department of Biology graduate program, and under his leadership during the last 10 years the Institute's programs in molecular biology have become well known and the department has grown to be one of the most distinguished in the nation.

In announcing the new appointment and Dean Hazen's retirement, Jerome B. Wiesner, Provost of M.I.T., called Dean Hazen "an eminent scholar and administrator, warmly devoted to M.I.T. since he first came here as a student nearly 47 years ago." In term of service, Dean Hazen is the senior active member of the Faculty of the Institute; he was head of the Department of Electrical Engineering for 14 years before undertaking his assignment for the Graduate School, a post he has held for the past 15 years.

Wilson Professorship

John M. Buchanan, Head of the Division of Biochemistry at M.I.T., is the Institute's first John and Dorothy Wilson Professor.

The endowed chair was established by gifts from Mr. and Mrs. John J. Wilson ('29); though it is without restriction as to department or field, Mr. and Mrs. Wilson hoped that the first appointment would be in the Department of Biology to recognize the growing importance of the life sciences at the Institute.

In their statement announcing Dr.



Irwin W. Sizer



John M. Buchanan

Buchanan's appointment, Jerome B. Wiesner, Provost, and Robert A. Alberly, Dean of the School of Science, called attention to "the increasing quality and quantity of biochemistry at M.I.T." since Dr. Buchanan came to head the division. In 1966 an American Council on Education study listed M.I.T. among the nation's six top biochemistry programs. "Dr. Buchanan is largely responsible not only for outstanding contributions to research and education, but also for the quality of faculty which he has brought to the Division of Biochemistry," they said.

Mr. Wilson, whose name the professorship carries, has been a Life Member of the M.I.T. Corporation since 1958 and its Secretary since 1959. His other distinguished services to M.I.T. have included membership on the Corporation Executive Committee (1959-61), the presidency of the M.I.T. Alumni Association (1958-59), and leadership of the M.I.T. Second Century Fund (1960-63). He studied for bachelor's and master's degrees in business administration and is now prominent in many industrial and philanthropic activities in Greater Boston.

Academic Freedom

Expressing concern over apparent "improper political pressure" at the University of California, the M.I.T. Faculty passed (125 to 96) the following resolution on April 12:

"Considering that the dismissal of President Clark Kerr by the Board of Regents of the University of California appears to have been a hasty action under improper political pressure; and

"Believing that the management of educational systems should not be subject to the vagaries of political activity; and

"Mindful of the fact that the University of California has been an inspiration to scholars and educators in this country and abroad by virtue of the quality and extent of its service to the people of California and of the whole country; therefore

"The Faculty of the Massachusetts Institute of Technology expresses its distress at the action of the Board of Regents and its hope that a healthy

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situation will be restored promptly at the University of California."

Ascher H. Shapiro, '38, chairman of the committee which wrote the resolution, told *The Tech* that this marked the first time in his 25 years at M.I.T. that the Faculty "has ever expressed itself on an issue which was not concerned with the Institute."

Kennedy Scholars

Four of the 11 1967 Kennedy Scholars named in England by the trustees of the Kennedy Memorial Fund will study at M.I.T. beginning in the fall.

They are Roger F. Barker, from Queen's College, Cambridge, who will study mechanical engineering; Margaret G. Brown, from Edinburgh University to study linguistics; Susan J. Poate, from University College, London, who will study mathematics; and Emma G. Rothschild, from Somerville College, Oxford, in economics.

For the New Technology

In a society that is becoming increasingly oriented to technology, educators must give their students a truly liberal education, built on both science and the humanities. This was the message

of Howard W. Johnson, President of M.I.T., speaking at the banquet at the annual meeting of the Institute of Electrical and Electronics Engineers in New York.

President Johnson was at pains to stress that in speaking of a liberal education he did not mean simply a liberal arts education, which virtually excludes physical science; "I would say such an education today may fall short of its 'liberal' objective . . . as it would offer the student a limited perspective. It would tend to shield him from exposure to and understanding of the forces of scientific discovery that shape our civilization; and it would deprive him from participating in the problem-solving activities of the technological revolution."

At the heart of the learning process geared to today's technological society, said President Johnson, the exchange between the teacher and student takes place at three distinct levels. First comes technical competence, or stretching the mind. Next is the level of integrating diversity for decision making, "of dealing with ambiguity, the standard condition of our time." Training the mind to ask the right questions and to be discriminating adds character to competence. Finally, President Johnson stated, students should be educated at the level of per-

sonal responsibility and contribution to society.

"If we can succeed in these forms of liberal education," President Johnson concluded, "if we can develop diversity within an interdependent technological society, we will have succeeded in making this country a more interesting model for others to examine."

Teachers' Oath

Massachusetts' controversial 30-year-old teachers' oath law has been invalidated by the Supreme Judicial Court, deciding a suit brought by Joseph Pedlosky, assistant professor of mathematics at M.I.T.

The law required every Massachusetts teacher to swear that he would uphold the Federal and state constitutions and perform his teaching job "to the best of my ability," and it was on the last phrase that the Supreme Judicial Court based its ruling. The more basic question of the constitutional pledge was not specifically resolved by the decision.

Dr. Pedlosky refused to sign the teachers' oath when he joined the M.I.T. faculty in 1965, and he secured a temporary injunction barring his discharge from the Institute for failing to sign it while his suit was before the courts.

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Electronic Music

Simply stated, electronic music seeks to expand the range of musical expression by enlarging its materials. The Sonic Arts Quartet, which performed in Kresge in March for the Course XXI Society, utilizes both familiar musical instruments, electronically modulated, and electronically generated tones to achieve their effects.

For example, the first work on the program, Gordon Mumma's "Commodius Means," written in 1964, employs a prerecorded tape of electronically synthesized sound as a constant background against which a trio of musicians play amplified harmonicas. The input from the harmonicas is modulated to produce sounds which are relatively free of harmonic overtones. These clear, intense sounds then contrast with the drone of the tape in discernible patterns.

This is not chance, or aleatory, music, of which John Cage is perhaps the best-known exponent. Mr. Mumma's score specifies for each player at each point in the composition the register in which the instrument is to be played (high, medium, low or mixed) and the nature of the sound which is to be produced (sustained tone, flutter, low or high tremolo, etc.). Each player had before him a stopwatch and played these specified sounds during the indicated time intervals in the work.

Robert Ashley's 1967 composition, "Frogs," had three components. From a recorded tape came the natural sounds of various species of frogs chirping, interspersed with explanatory comment. Two members of the quartet, in a kind of pun on the title, as in "a frog in my throat," placed microphones against their voice boxes while they repeatedly counted "one-two" and "one-two-three-four-five," respectively. The result was a muffled, muted background against which Mr. Ashley read some notes to the recording of the frogs plus a sort of social-commentary monologue. These first compositions left this reviewer unmoved; there was no feeling of ideas developing in Mr. Mumma's score, and the three incoherent elements in "Frogs" seemed to vie for attention and to resist attempts at reconciliation.

Two works by David Behrman and Alvin Lucier made more of an impact. Behrman's "Runthrough," composed this year, was a short work which used an amplified oscillator to produce a sonic field behind the



PHOTO: BILL MOULTON (CAMERA WEST) FROM PACIFIC SCIENCE CENTER

Vannevar Bush, '16 ("the grand old man of science," said the Seattle *Post-Intelligencer*), was honored this spring in Seattle when he delivered the first Magnuson Lecture at the Pacific Science Center. Praising Senator Warren G. Magnuson, whom the lectures honor, Dr. Bush said that without his insight in the national legislature the nation would not today have its solid scientific base; Senator Magnuson's help, he said, made it possible for the U.S. to have the services of 6,000 of its most sophisticated men and women during World War II. Between Dr. and Mrs. Bush (above) at the dinner preceding his lecture is Thomas Carlile, president of the Pacific Science Center Foundation; and Senator Magnuson is at the right.

sounds of high-pitched wire strings, as in a piano or harp, being played by the composer with a violin bow. Although, according to Mr. Behrman, the work had had the least preparation and was to some extent improvisatory, by limiting its scope and materials it succeeded in making an interesting statement which had an air of unity and purpose. One could sense a controlled development of ideas by programmatic content; the piece made its point on its own terms and therefore was the most appealing work offered.

Mr. Lucier ended the evening with his 1966 composition, "Shelter 9,999," its title taken from a film by Takahiko Iimura. This work was a generally successful attempt at an integrated aural-visual experience. A jagged circle of light, sporadically filtered, flickered nervously and percussively in the upper left corner of a screen; to the right Iimura's film flashed arrows, numbers, letters and words; and in the background soft, blurred colored slides changed slowly. Mr. Lucier's sound track for this performance, four channels of a sixteen channel tape, established the Iimura film's idea of a bomb shelter with explosive, roaring sounds on two tracks which suggested strange, electronic warfare. Another track rhythmically complemented the frightened spot; the fourth mirrored the indistinct slides which

evoked the sense of indeterminacy as to the outcome of the struggle. The predominant effect of an integrated whole was very arresting.

Electronic music is very experimental, and it often neglects its grammar in its desire to expand its vocabulary. What is needed is a sense of form, rigor, and discipline to control the large array of techniques. The Sonic Arts Quartet exemplified this point. The two compositions which were noticeably bounded were the more successful; the other two were much less eloquent.

—Ralph B. Earle, Jr., '67

Library Grant

A \$250,000 grant to M.I.T.'s Project INTREX by the Council on Library Resources, Inc., of Washington, D.C., will be used to continue research initiated under an earlier grant from the Carnegie Corporation, New York City, aimed at providing guaranteed rapid access to documents at locations remote from a research library.

The one-year grant was announced by Carl F. J. Overhage, Director of Project INTREX, and Verner W. Clapp, Council President. It will be used for experiments to compare the advantages and disadvantages of various techniques of document storage, selection, transmission, presentation, and reproduction required in such a decentralized, full-text access system.



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PHOTO: JEFFREY M. REYNOLDS, '69

Robert F. Tinker, a graduate student in physics, came to M.I.T. last fall with the unusual experience of two years' teaching in a one-man college physics department. It all began when Bob found himself "fed up" with studying and settled on a teaching job at Stillman College, a predominantly Negro school in Tuscaloosa, Alabama. Challenged by the opportunities and problems, Bob and his wife founded Recruitment of Southern Teachers, a movement to urge others to join in helping southern college teaching. Now his RST has come of age with support from the Fund for the Advancement of Education, and Bob and his wife have returned to their studies, this time at M.I.T. But Bob is still busy guiding RST and interviewing (above) prospective teachers.

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The research and development efforts are under the direction of J. Francis Reintjes, director of the M.I.T. Electronics Systems Laboratory.

Project INTREX is a systematic program of information transfer experiments directed toward the design of integrated library services that might become available at M.I.T. and elsewhere in the decade beginning 1970.

Toward Foresight

There are "more important things to do on earth" than send men to Mars, Jerome B. Wiesner, provost of M.I.T., told a Dallas *Morning News* reporter this spring in connection with a visit to the M.I.T. Club of Dallas.

The money that would go for a Martian landing program might better be applied to improved education, medical care, agriculture, and other of the earth's "domestic" problems, Dr. Wiesner said. Already many of these are being worked on and some are yielding to the advance of scientific knowledge; for instance, there are marked advances in the life sciences which may mean that we can soon determine genetic behavior.

It is not that science and technol-

ogy are moving too fast, Dr. Wiesner told the reporter; it is that humans must learn better foresight. "We have to learn over the next decade to be a little more thoughtful of what we do, to do a better job of early warning and of recognizing what's going to happen."

Fassett Foundation

The Julie Fassett Foundation, "to enhance the amenity, beauty, and civility of life at M.I.T." and to perpetuate the memory of Mrs. Frederick G. Fassett, Jr., has been established by a student committee with an advisory board of Alumni, administration, and faculty members.

Mrs. Fassett's death last fall, only four months after she and Dean Fassett retired to Damariscotta Mills, Maine, crystallized the concern that something of a permanent nature be done at M.I.T. in their memory and honor. The foundation's first project, under a charter "to restore to M.I.T. and its students a portion of that which we cherished and which has been lost," will be to develop a garden-retreat. The proposal is described by Kenneth C. Browning, '66, one of the foundation's founders, as "a place where students may go to escape momentarily the pace of M.I.T."

The student body is raising funds in

the M.I.T. community for this first project, but assistance from Alumni will be necessary to achieve the garden project and to provide for similar future activities, according to Mr. Browning. Alumni Fund gifts may be designated for the Julie Fassett Foundation, he said, and gifts and questions may be sent to the foundation in care of the Institute Committee in the Student Center.

Wilson Fellows

Seven M.I.T. seniors have been designated for next year's Woodrow Wilson Fellowships, and 10 more have been listed as alternates. They are among 1,259 winners on all college campuses, chosen in turn from 13,596 students nominated by their respective colleges.

M.I.T.'s 1967-68 Wilson Fellows are Daniel S. Drucker, Miss Edie Goldenberg, Bruce Jacobs, Joel R. Karnofsky, Eugene M. Kleinberg, Frederick H. Kuttner, and George Starkschall. They will attend the graduate schools of their choice with their tuition, an allowance to the school, and a stipend of at least \$2,000 paid by the Foundation.

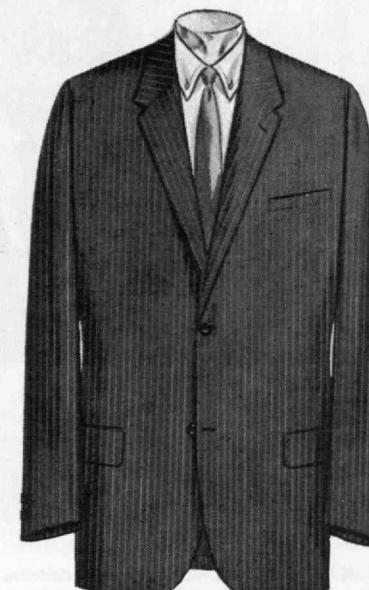
No Neutral Reactions

Several M.I.T. students are expected to be among more than 60 university engineering and science students in the 1967 student cooperative training of Geophysical Service, Inc.

It will be the program's seventeenth annual session, and its planning coincides with completion by Robert R. Shrock, Professor of Geology at M.I.T. and one of the program's co-founders, of a modest book on the history and evaluation of its first 15 years, 1951-1965.

Students in the 1967 program will go to the Dallas headquarters of GSI early in June for "orientation" sessions which are really a professional meeting-in-miniature. There will be over 40 lectures by outstanding earth scientists, tours of Dallas-area industrial laboratories, and social occasions for students and lecturers to meet. The sessions are so good that they now attract college faculty and oil company explorationists who want to update their own knowledge.

After the four-day meeting, members of the summer program will join field parties or research laboratory groups of Geophysical Service, Inc., or Texas Instruments, Inc., for the rest of the summer. Their assignments will range from geophysical field work with surveying, recording, shooting and drilling units to laboratory assistance in basic research. Each student will be evaluated by his supervisor, and each will write a special report on his sum-



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Students in all the first 15 years of the summer cooperative training signed these commemorative plaques for the program's two founders: Robert R. Shrock, Professor of Geology at M.I.T., and Cecil H. Green, '23, honorary chairman of Geophysical Service, Inc. The presentation was made at the 16th annual orientation conference of the program in June, 1966.

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mer experience.

The program was founded in 1951 by Professor Shrock and Cecil H. Green, '23, who was then President of GSI, as a plan for providing field work for M.I.T. students and increasing their interest in geophysics careers. It was soon expanded to serve all American colleges, and in the first 15 years it accepted 308 students from 78 schools. Of these, 268 had summer field work and 40 served in Dallas laboratories under what is called the Summer Development Program.

For his 15-year survey, Professor Shrock sent questionnaires to all 268 field-work "alumni," and he reports that their responses were on the whole enthusiastic. "The returns indicated that the trainees gained much from their experience, and almost all strongly recommended that the program be continued," he says.

Most of the participants rated the orientation lectures as an outstanding feature of the experience; this is a special tribute to Dr. Green, says Professor Shrock, because he has arranged the meetings and "much of the sustained high quality of the conferences has been due to his success in obtaining outstanding men."

The reaction to the field work varied more widely—from enthusiasm to disgust. "There were no neutral reactions," Dr. Shrock reports. "However, for the one student who consid-

ered the work 'just a summer job,' there were ten who enjoyed their work, thought it was valuable, mentioned ways in which they had profited from what they learned, and strongly recommended that the program be continued," he says.

Forty per cent of the students in the field work say their choice of geophysics as a career was made or confirmed by the summer experience. Over 20 per cent decided they did not like field work but wanted to stay in geophysics or in fields closely related to it. And 13 per cent said that the summer field work helped them decide against geophysical work as a career. Even those who decided against geophysics are not total losses, says Professor Shrock, for they "learned what they did not want to do; so even they gained from their summer assignment."

"Perhaps it is not unreasonably optimistic," Professor Shrock concludes, "to assume that over the long term, when the current crop of students is all employed, the actual percentage of coop student participants who will ultimately find careers in petroleum exploration in a broad sense may be as much as 70 per cent."

Rocks from the Moon

The first Apollo astronauts on the moon will collect and bring back to earth with them about 50 pounds of rocks from the moon's surface. Earth-bound scientists are already standing in line for a chance to work with the priceless samples, and now NASA has

confirmed the order of priorities so the scientists can prepare their experiments.

M.I.T. faculty on the list, according to Victor K. McElheny, science editor of the Boston *Globe*, include Klaus Biemann, Professor of Chemistry; Patrick M. Hurley, '40, Professor of Geology; M. Gene Simmons, Professor of Geophysics; and David W. Strangway, Assistant Professor of Geophysics.

Dr. Simmons proposes to measure some of the rocks' more subtle physical characteristics—their conductivity for heat and electricity and their elasticity; Dr. Strangway will study their magnetic properties. Dr. Hurley will analyze samples for traces of uranium, lead, strontium and rubidium formed during possible radioactive decay—a method of determining geological age. Dr. Biemann's project will be an analysis for organic compounds necessary to support life.

Visiting Professor

The Boston *Globe* has reported that Richard N. Goodwin, who was a staff assistant to President John F. Kennedy and later to President Lyndon B. Johnson, will be a visiting professor at M.I.T. next year, but confirmation has not been available in Cambridge.

Mr. Goodwin has been at the Center for Advanced Studies at Wesleyan University since resigning from the White House in September, 1965. His association with President Kennedy began during the presidential campaign in 1959-60, and he was assistant special counsel in the White House and later held Peace Corps and State Department assignments. He returned to the White House to join President Johnson's staff in 1964.

More recently Mr. Goodwin's name has been associated with Senator Robert F. Kennedy and with the Kennedy family's efforts to modify William Manchester's book *The Death of a President*. He is now a "sharp critic of administration Vietnam policy," according to the *Globe*.

L. S. Smith, 1880-1967

Lawrence S. Smith, '00, who taught in the M.I.T. Department of Mechanical Engineering for 50 years following his graduation from the Institute, died in Newton on March 19.

Professor Smith, whom some Alumni will remember as "Slave-Driver Smith," retired in 1945 as Associate Professor, Emeritus, of Applied Mechanics, but he continued to lecture at the Institute until 1950. He was also an instructor in the Lowell Institute School for nearly 30 years and in the Y.M.C.A. evening school in Boston. Surviving are his wife, a son, a daughter, and six grandchildren.

some Spring memories

This year 12 classes celebrate the quinquennial anniversaries of their Springs

Many and varied were the happenings that made those months memorable

1907



At Class Day, historian and statistician Donald G. Robbins, read thesis: "An Investigation and Determination of Actions and Reactions of the Class of 1907 and Certain Other Reagents"

1912



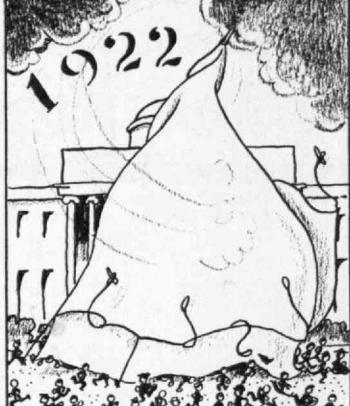
Tech Night at Pops saw masked stranger on a float - "Mr. SMITH", donor of \$2.5 million for new buildings in Cambridge... riding with him, an "Alumni Fund Boy" throwing out subscription cards

1917



Commencement in short version as most of class leaves for Plattsburg, Navy, flying schools, Ambulance Field Service, shipyards, etc

1922



Graduation of "largest class ever" planned under Big Top in Great Court. Simple exercises (only 6 theses), cut short when tent blew down

1927



Class of '27 welcomed at big Alumni Convention in N.Y., see talking movies of MIT (afirst), also "MIT Radio News" on 3 screens, including interviews with Sir Oliver Lodge and C.A. Lindbergh

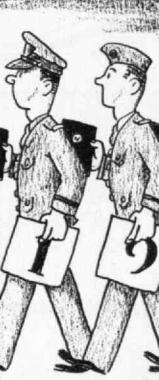
1932



Editorial in The Tech: "In spite of the bleak appearance... the 1932 graduate will eventually obtain work!"



Class Day program, (with Alumni), hits high-water mark. Philip H. Peters spoke like all-get-out for the Seniors" (Review)



First War II class graduates April 27, "quickly disperse to take their places in armed forces." E. Pennell Brooks '17, who did the same thing 25 years earlier (and earned DSC), was Class Day speaker

1947



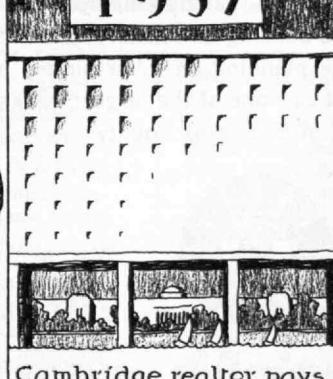
Job prospects are good. Starting salaries for SB holders hit new high of \$200-\$300 monthly

1952



Spring "pantie raid" riot catches Dean in middle; arrested on fake charge of "inciting to riot" HB KANE

1957



Cambridge realtor pays \$5,000 for option on 36 acres of Charles River bottom in front of MIT. Huge building development on stilts projected

1962



At Commencement, Class of '62, "a body of considerable men" (Stratton), hears music composed by grad. student, "Intermezzo Giubiloso" — theme derived from notes in scale in 1962 sequence

Gamma Ray Telescope

A highly sophisticated gamma ray telescope prepared at M.I.T. is now circling the earth at 350 miles' altitude, scanning the sky for evidence of interactions between cosmic rays and interstellar matter. It is one of nine experiments launched on March 8 aboard the National Aeronautics and Space Administration's Orbiting Solar Observatory III.

A radio signal broadcast two days after launch turned the telescope on, and within hours the M.I.T. group had confirmed that the device was working as planned. The initial tests showed that, when pointed toward earth, the telescope found numerous gamma rays—emitted when cosmic rays collide with atmospheric air particles. When pointed spaceward, the rate of detection of gamma rays was very much less. This was as it should be, and it gave the M.I.T. group confidence that the data which the telescope reports on gamma rays from space will be reliable and accurate.

The M.I.T. gamma ray telescope is one of the most complex astronomical instruments ever orbited. It is capable of selectively detecting gamma rays with energies of 100 million electron volts or more.

Detection and measurement of these gamma rays, therefore, will provide a new means of determining how matter and cosmic rays interact in various regions of the universe and will open a new approach to exploring the conditions that prevail where cosmic rays are born.

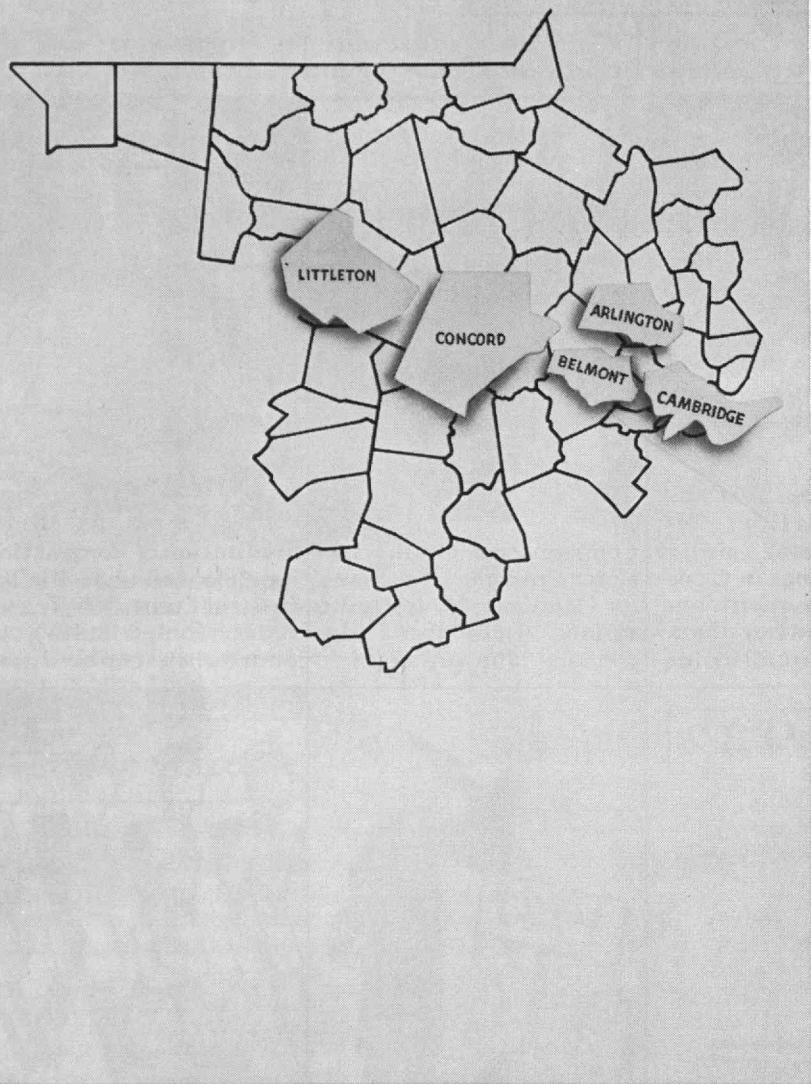
The gamma ray detector was developed in M.I.T.'s Laboratory for Nuclear Science by William L. Kraushaar (now at the University of Wisconsin), Gordon P. Garmire, '62, and George Clark. William G. Schmidt, '62, Daniel Galvin and F. William Sarles, '55, at the M.I.T. Lincoln Laboratory were responsible for the design and construction of the electronic analysis and control system.

Secretary for Foundations

Walter L. Koltun, '48, Special Assistant to the Vice-president and Secretary of the Institute, has been named Institute Secretary for Foundations, succeeding David J. Tobin, '46.

Mr. Tobin, in turn, will devote full time to development work in connection with charitable trusts.

Dr. Koltun returned to M.I.T. in October, 1965, from science administration work in Washington, D.C., to take responsibility for coordinating the operation of the Corporation Visiting



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Committees and to provide general assistance to the development program. He will continue these assignments while also taking on the task of planning and developing M.I.T.'s relationships with philanthropic foundations.

Individuals Noteworthy

Jack P. Ruina, Vice-president of M.I.T., is now on the board of trustees of the MITRE Corporation.

John C. Slater, who joined the Institute Faculty in 1931 and is now Institute Professor, Emeritus, has been awarded the 1967 Irving Langmuir Prize of the American Physical Society. Dr. Slater is now graduate research professor (physics) at the University of Florida.

Victor F. Weisskopf, Head of the Department of Physics, has received the University of Chicago's honorary degree of Doctor of Science.

B. Alden Thresher, '20, Director of Admissions Emeritus at M.I.T., is vice-chairman of the Select Commission on Tests of the College Entrance Examination Board; the Commission's assignment is to review the Board's existing examinations and make recommendations for changes to meet needs of today and of a decade hence.

Charles T. Dwight, '30, formerly Assistant to the Chancellor of the University of Hartford, is now treasurer of the University.

General **Joseph M. Colby**, '35, is now vice-president for technical growth of the Rockwell-Standard Corporation, and **Hamilton Herman**, '43, is president of the Industrial Divisions.

Holden W. Withington, '39, Director of Supersonic Transport Engineering at Boeing Co., will head that company's supersonic transport program as vice-president and SST branch manager in the Commercial Airplane Division.

Clifford S. Gerde, '44, Professor of Mechanical Engineering at Purdue University, is now also assistant dean for academic affairs.

Ezra S. Krendel, '47, has been appointed director of the Management Science Center at the Wharton School of Finance and Commerce.

Richard W. Eddy, '48, is now executive vice-president of the Chemicals and Plastics Operations Divisions of Union Carbide Corporation.

David Tod, '49, is now vice-president of Merrill, Turben and Co.

Markwick K. Smith, '51, whose appointment as President of Geophysical Service, Inc., was announced last fall, has now been made a vice-president of the parent company, Texas Instruments, Inc., and manager of its Science Services Division. He was formerly GSI vice-president for research, development and engineering.

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Carlisle W. Fiers, U. of P. '50, Exec. V.P.

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Seminars

General Seminar:

Is It 17 Years To "1984"?

*Marshalling Human Resources in
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Four presentations of four aspects of the problem — then smaller discussion groups followed after lunch by an open panel discussion led by Provost Jerome Wiesner.

Management Seminars:

Presented by the Alfred P. Sloan School of Management.

"A Systematic Approach to Market Planning"

"Market Oriented Management Systems"

"Tomorrow's Manpower and Industrial Relations Issues"

"Stock Prices and Corporate Financial Policies"

Socializing

These challenging and rewarding seminars are reason enough to attend Alumni Day 1967. But you will also enjoy:

the opportunity to meet friends and classmates at the social hour and dinner

something-for-every-taste entertainment
The unique Mariachas (folk musicians) from Mexico, Acapella Choir, a rollicking Banjo Band and several really great surprises

dancing to the music of Ruby Newman

P.S. Your ladies will have plenty to do and we hope they'll be with you. The seminars and activities have been planned with them in mind.

If your class year ends with 2 or 7 you'll be reuniting nearby on June 10th and 11th. So winding up at M.I.T. on the 12th is a *must* — particularly if you haven't returned in the past 5 years.

Circle June **(12)** right now and reserve your places for Alumni Day 1967.

Class News

'96

Frank R. Cook died on February 11, 1967, in Rochester, Mich. Through the courtesy of his nephew, Captain Charles O. Cook, Jr., USN, Ret., the following information was received: "In the first years after Tech he engaged in construction work in upper New York State and possibly elsewhere. Sometime thereafter he returned to his family home in Detroit. About 1919 he bought a farm near Rochester, Mich., and commenced operating it; from that time until two years before his death it was his home. Perhaps the greatest achievement of my uncle's 95 years was his good health and good spirits. Although he had no children and his wife had died close to 30 years ago, he continued to live at the farm by himself, preferring the country to being cooped up in the city. He remained vigorous until the fall of 1965, driving his own car up to that time. Forced at last to give up his mobility and to enter a nursing home, he still attended to the details of his own business until the first of this year when his last illness set in. His independent spirit and ready sense of humor never deserted him!" The captain extends his best wishes to the members of the Class of '96. . . . **Harold S. Boardman**'s wife died last December 22 at Waterville, Maine. She was 88 years old, and he is almost 93. They had lived together for nearly 55 years. Harold wrote a memorial tribute to his wife at the time of her death which was read at the funeral service. Very soon he intends to go to his summer home at Bar Harbor.—**James M. Driscoll**, Secretary, 129 Walnut Street, Brookline, Mass.

'99

Our Alumni Reunion on June 12 will bring together a few stalwarts of '99 who are usually present at the noon luncheon in the Great Court if the weather is auspicious. **Norman Seavey** from Florida, **Carroll Brown**, New Hampshire, and **Hervey Skinner** and your Secretary from Massachusetts would be delighted to see or hear from our classmates. When the Secretary gathers news about a member who has passed on, he is saddened that we did not know about the activities and interests which would have pleased and oftentimes thrilled his friends. If transportation difficulties prevent your personal attendance, please write a nice "homey" note to the Secretary that he may read to those present and use in the next Review.—**Percy W. Witherell**, Secretary, 1162 West St., Wrentham, Mass. 02093

'02

Once again I have to record the passing of a classmate, **William de Forrest Crowell**

who died in St. Louis January 16. He was a member of the architectural firm of Mauran, Russell and Crowell and had been responsible for the design of many of the major buildings of St. Louis. He started his career after leaving M.I.T. in 1902 as a draftsman with Parker Thomas & Rice, architects in Boston. In 1905 in open competition he won the Rotch Traveling Scholarship in Architecture and went to Europe for two years of travel and study. In 1907 he was admitted to the Ecole de Beaux Arts in Paris. On his return to this country he worked for the committee that prepared plans for the beautification of Pittsburgh, and following that was for some time in Buffalo. About 1910 he became a member of the St. Louis firm and remained with it until his retirement in 1950. Upon retirement he took up oil painting as a hobby, having had some experience with water colors in his student days at Ecole des Beaux Arts. He was an aviation enthusiast and in 1930 had made a flight in the Graf Zeppelin from Frederichshaven, Germany, to Moscow. He also for a number of years had a boat of his own design in which he cruised the Mississippi. In 1934 he married the former Miss Monica Dionysius of Kirkwood who survives him as do a daughter, Miss Janet Crowell of New York City, Wm. de Forrest Crowell, Jr., St. Louis, and a brother, Robert Crowell of Fort Lauderdale, Fla. I am indebted for much of the above data to a clipping from the St. Louis *Post-Dispatch* sent me by Harold F. Tonsing, '32, of Weymouth, who had worked in Crowell's architectural office during the early 1920's. . . . As this is being written in March there is nothing definite to present about our 65th in June.

—**Burton G. Philbrick**, Secretary, 18 Ocean Ave., Salem, Mass. 01970

'03

National research has now come forth with a new super-conductor material (FO-46:F) that loses all resistance to electric current flow and can carry tremendous current loads. For years great strides have been made in development of these materials. Light alloys have been produced that are particularly amenable to super-conduction. This new material is known as niobium titanium and used to enclose a bubble chamber of magnet at Argonne National Laboratory near Chicago. The magnet is liquid hydrogen, ten feet high and 14 feet in diameter. Beams of high-energy particles from an accelerator are directed into the bubble chamber to smash the hydrogen atoms within, in an effort to probe deeper the nature of matter. These flying fragments leave bubble trails that to bend and photograph requires a powerful magnet. This magnet is immersed in a bath of liquid helium which is also enclosed in turn by very cold liquefied gas as hydrogen. This devise at present is the largest known. It can now supply a variety of uses: storage of electricity for emergency uses, creation of a magnetic field about a spacecraft to protect occupants from solar radiation, long-range transmission of heavy-direct current loads

Happy Birthday

We have a large number of Honor Roll birthdays this month, especially those celebrating their 80th. Two alumni will celebrate their 95th birthday, one his 90th, seven their 85th, and 21 their 80th.

May, 1872—CHARLES W. BERRY, '95, on the 21st; CHARLES G. ABBOT, '94, on the 31st.

May, 1877—W. CORNELL APPLETON, '01, on the 21st.

May, 1882—FREDERIC A. FENGER, '09, on the 1st; ROBERT J. ROSS, '06, on the 2nd; WINFRED A. TAYLOR, '05, on the 2nd; T. HERBERT FILES, '05, on the 17th; RALPH O. INGRAM, '04, on the 21st; FRANK A. BENHAM, '06, on the 23rd; CHARLES J. GRIFFIN, '03, on the 25th.

May, 1887—FRANK A. BAKER, '10, on the 1st; CLIFFORD S. REDFIELD, '10, on the 1st; WALTER H. TRIPPLETT, '12, on the 1st; CARL H. BANGS, '08, on the 2nd; ARTHUR H. TURNER, '09, on the 2nd; EDWARD S. HOWE, '10, on the 3rd; MAX C. SHERMAN, '10, on the 11th; JOHN A. CHRISTIE, '09, on the 12th; MELVILLE K. WEILL, '09, on the 14th; DENISON K. BULLENS, '09, on the 18th; H. NORRIS HARRISON, '10, on the 18th; DAVID E. BARTLETT, '11, on the 19th; HAROLD W. DANSEN, '12, on the 19th; OSBORNE H. SHENSTONE, '11, on the 19th; JOHN C. TUTTLE, '10, on the 24th; AUSTIN W. BROOKS, '11, on the 25th; ABRAHAM S. COHEN, '08, on the 25th; L. G. BEERS, '09, on the 27th; LEONARD O. MILLS, '11, on the 29th; EDWARD KENNEDY, '11, on the 30th; RALPH S. PEASE, '11, on the 31st.

with no power loss, and finally the substantial saving in money through use of semi-conductors.

Among the numerous and enthusiastic classmates of ours in line for distinction appears our **Howard Scott Morse**, I, of Indianapolis, Ind. Scotty Morse was born in Dedham, Mass., and after being qualified to join the group of students that clustered within and without the halls of Walker and Rogers, the Boston domain of M.I.T., he graduated in '03. The summer after graduation Scotty worked for the Pennsylvania Railroad as instrument man on double-tracking and maintenance of way on the Erie and Ashtabula Division with headquarters at New Castle, Pa., for \$50 a month. And the railroads were at their peak. However he now decided to become an instructor in college and returned to his alma mater as assistant in surveying and civil engineering. But again after a year he definitely decided a career as teacher was not his destiny. In 1904 the Reclamation Act of Congress became prominent so he was assigned as resident engineer from 1904 to 1908 to the Lower Yellowstone Irrigation Project in eastern Montana. Although he enjoyed the out-of-door life on the plains by horseback, his work on the second division of the project being finished, he tried to resign and return to civilization rather than accept a transfer to another project. His resignation was not accepted. Being told the unstable condition of our country and the (1907-8) "Panic" now termed depression, he was given a leave of absence without

pay. Scotty now turned up at Louisville, Ky., as resident engineer in construction of a sewage system for the city. It was in Louisville he met his future wife Mary Shreve Polk, a "damned Yankee" marrying a "daughter of the Confederacy." The combination worked perfectly and produced a son and daughter and now five grandchildren, all living in Indianapolis. Mrs. Morse passed on in 1957.

When first married Scotty lived in Cincinnati, Ohio, where he was assistant city engineer in charge of sewage construction, a job which included the making of a topographic map of Hamilton County in which Cincinnati is located. He next became director of the Cincinnati Bureau of Municipal Research and then engineer for the Detroit Bureau of Governmental Research. He returned to Ohio in 1918 as director of public service in Akron, Ohio. Here he lived seven years. Scotty came to Indianapolis in 1925 as general manager of the Indianapolis Water Company, a privately owned regulated public utility serving the city and vicinity. He finally retired as chairman of the board of that company on 1960 and though no longer active as he understands the term, yet has never loafed and even now is a member of the mayor's advisory committee on flood control. He is also a member of various organizations in Indianapolis, as Rotary, and he has become an honorary member of the American Water Works Association and honorary member of the Society of Civil Engineers. In 1953 he received the George Warren Fuller Award for meritorious service in the water works field.

A brief note just received from Emeritus Professor **Audrey A. Potter**, VI, who is still very active and just returned from a consulting assignment in Atlanta, Ga., Marion and Charlotte, N.C., says that he looks forward with enthusiasm to attending our 65th Reunion. . . . **Jim Welsh**, VI, far from the rigors of our New England storms, announces his part in programs of March 23 and as past president at a dinner and business meeting on March 25 of the University Club, Winter Park, Fla. . . . A cheerful line from **Gus Eustis**, III, who is still enjoying a restful period at Key Biscayne, says he expects to be back at his office by March 15. . . . **William C. Lounsbury**, VII, has a new address, 1516 West Court St., Janesville, Wis. . . . **Frederic A. Olmsted's**, X, new address is 297 Miller Ave., Mill Valley, Calif. . . . And **Arthur B. Allen's**, II, is c/o Douglas G. Cole, 1975 Brainard Rd., Lyndhurst, Ohio. . . . Our happy birthday greetings to Frederic A. Olmsted on February 27 and **Ichabod F. Atwood**, II, of Topsfield, Mass., on February 28 for their 80th milestone. . . . **Carl T. Bilyea**, IV, joined our deceased January 20 with no information furnished.—**John J. A. Nolen**, Secretary, 13 Linden Ave., Somerville, Mass.; **Augustus H. Eustis**, Treasurer, 131 State St., Boston, Mass.

'04

Spring is here but it hasn't brought any news of interest from our classmates. I

hope some have taken winter vacations and will send me the details later. Our good friend **Frank Davis** (961 Burns Avenue, Detroit, Mich.) is having quite a bout with arthritis and I am sure would appreciate a card to cheer him up. . . . Late news is that Mrs. Bernard Blum passed away in February. . . . We have one death to report, **Clifford S. Dewis** of Calgary, Alberta, Canada, in November 1966. One change of address is **Edward S. Morrison**, Courtland Apts., 4260 Chestnut Street, Philadelphia, Pa. 19104.—**Eugene M. Russell**, 82 Stevens Rd., Needham, Mass. 02192

'05

It's not a case of "no news is good news" but that whatever news there is this month is bad news. I have to report that **John C. Damon**, VI, died at his home in Closter, N.J., on March 8, 1967. I noticed in the *Boston Herald* too late for me to get down that a memorial service was to be held at the First Unitarian Church, Newton, Mass., on the following Saturday. John was my idea of a patriot and as it turned out, a martyr. He served in World Wars I and II and later volunteered beyond the call of duty and served as a civilian in the Korean War. He told me that his job was to try to see that the U.S. contribution to that war, food, materiel, etc., was used for the purpose intended. I know that he was discouraged by the wastage, pillage, etc. While in Korea he contracted a disease from which he never fully recovered. . . . I have just learned through the Alumni Association that Professor **Joseph Daniels**, III, of Seattle, Wash., died on January 20, 1967. I had heard from Joe around Christmas time and realized he was not too well, but did not sense it was his terminal illness. I have sent the sympathy of the class to Mrs. Daniels and may have more details of his rather recent life work. Who can forget Joe in the Tech shows as Professor Albite in "A Scientific King" or the lunatic in "Simon Pure Brass" or William the Pot Boy in "Applied Mechanics" or Polly (a simple miss) in the "Chemical Maid"?

Ruth and I telephone or write Elizabeth Babcock fairly regularly as Court has been in the Phillips House (hospital) for 10 weeks hoping that his condition would improve so that a broken hip could be set. Conditions have not improved much (as of March 15). I am sure all our hopes and hearts are with Elizabeth during these trying days. . . . You will read these notes in time to start thinking about our 62nd Reunion. No formal celebration this year, but we should gather in good numbers at our table on Alumni Day. Since there are 40 of us, including wives, daughters, etc., within easy distance of Cambridge, we should again have a good turnout. We telephoned **Willard Simpson** at his home in San Antonio recently and found him "in tolerable condition," unhappy because the temperature there was down to 30 degrees. When I told him the thermometer at our house at that moment was minus 32, he was

flabbergasted. When he receives some pictures of my house and dooryard banked 7-8 feet high with snow, he may believe it.—**Fred W. Goldthwait**, Secretary, Box 32, Center Sandwich, N. H.

'06

In February came letters from my two good Far Western correspondents, **Bob Cushman** and **Guy Ruggles**, reporting progress. Bob was in the hospital for the fourth time expecting to be out soon and driving the car to visit his wife Ruth, also making progress toward recovery. One of Bob's avocations is collecting ship pictures, of which he has a sizable number, and in my last letter to him I mentioned a small card I have which contains a picture of the 16 ft. sailing dory *Centennial* in which Capt. Alfred Johnson in 1876 sailed from Gloucester, Mass., to Liverpool, England, in 66 days. I said, "I'll bet you haven't any picture of that dory," but sure enough he does, in color! He also has a picture of the *Spray* in which Capt. Slocum sailed alone around the world in the long ago. What's your hobby or avocation? Tell me about it, or them. In his long letter Guy reported he was slowly recovering from his eye operation and, "After the operation when one gets out on the street with a big patch over the eye, it is surprising how many people will stop and tell about their experience." Guy said there was only one error in the January notes, telling about the award to **Charles Willis** and Guy's being south in Mexico for two short periods. "It was the family home from July 1, 1940, to June 1, 1955. We all enjoyed our life in Mexico, and I consider that it was fortunate that we were sent there." Guy has a new phone number in Phoenix (602-955-8894) and Charles has a new address—917 Encanto Drive SW, Phoenix, Ariz. 85007. . . . One of our classmates, now deceased, William Couper, was a graduate student from VMI where he later was active in alumni affairs. He kept expressing the opinion and his belief that it was the duty of every VMI man to report in every contact with, and every clipping about, a VMI man. What a help it would be if we Class Secretaries heard of every contact and received such clippings! Some of our Secretaries do pass along such information about men in other classes, and one of them is Fred Goldthwait, '05, who now lives in retirement in New Hampshire. Fred spotted an article in the *Boston Herald* of March 6 and sent me a small clipping. I had seen the long story headed "Woman in the News," about Betty Furness, whom President Johnson had just named as his special assistant for consumer affairs. Containing a photo of the very attractive Betty (actually Elizabeth Mary), the writer called her "an energetic, irrepressible woman who looks and acts more like a college girl than the widowed grandmother she is." Betty was the only child of my classmate, George C. Furness who died in 1944. At the age of seven she got her first taste of radio broadcasting when she accompanied her father to the NBC studio where George made commercials

for Union Carbide Company of which he was a longtime executive. At the age of 16 Betty signed a contract with RKO and in the next six years made 35 films, retiring from the screen at 21. For the past few years she has been active in politics, hence her recent appointment by LBJ. George would be pleased! Incidentally, Fred said that her step-mother lived near them, and so they hear a lot about said VIP.

How do you like the Review in its new format, the Reviews on Science, Books and Education, the Puzzle Corner, the Trend of Affairs, the Institute Gazette, and all the rest, not to mention the class notes on their different, colored, stock? Do you receive the Review, and do you read it, all of it? Likewise do you receive other Institute publications, such as the Report of the President? I have just received and read Dr. Julius Stratton's last report as president, for the year 1966, and am tempted to include numerous quotes from it. I'll settle for only two. One is on page 15, "Whereas once for the overwhelming majority of students, the four undergraduate years represented a complete and self-contained preparation for a specific career; today rather than a culmination they constitute only a stage along the extending road of formal education." On page 32 after stressing the need for improved and more student housing, "Dean Emeritus Pietro Belluschi has developed a very appealing design for a complex of two dormitories on Memorial Drive west of Burton House. In December Mr. Frank S. MacGregor, '07, made a gift of \$2 million toward the cost of one of these two dormitories. It will be named MacGregor House. The two basic architectural elements are a single 17-story tower and a four-story walkup." Does that take you back to those happy days on Boylston Street and the combined lounge, study, window refrigerator, and bedroom on Dartmouth St. or St. Botolph, or the daily commute from here and there? The softies grow wise in the lap of luxury now-a-days, seems like! Before the closing hymn we have a special announcement, quite exciting for Marion and me. Our older granddaughter Nancy became Mrs. Archibald Main Gallup on March 11, so we had several enjoyable days in Waterford, Conn. Her husband goes at once into training with the 101st Airborne, but Nan will be nearby.—**Edward B. Rowe** Secretary-Treasurer, 11 Cushing Road, Wellesley Hills, Mass. 02181

'07

Before these notes reach you early in May 1967, each class member will have received a letter containing complete details about our 60th Reunion which is to be held on the M.I.T. campus in Cambridge beginning Friday afternoon, June 9, and continuing through Alumni Day, Monday, June 12. It is not expected that the attendance will be over 20. . . . A recent letter and check from **Kenneth Chipman, III**, has brought the total of our class treasury up to \$255. "Chippy," who lives in Ottawa, Canada, was thoughtful

enough to wait until he visited the states before sending me his check. In this way our treasury got the full benefit of his gift and did not have to lose any money on account of the rate of exchange. . . . Thirty-eight of the class members have sent in dues. If you have forgotten to mail in yours, it is not too late to do so now. We have not so large an amount in the treasury that they are not needed. Anything from \$1.00 up is very welcomed. All gifts of \$5.00 or over I will personally acknowledge by letter. . . . **Howard Marvin, II**, wrote that Mrs. Marvin had broken her leg last October and was still in the hospital but was learning to walk. He doubted the possibility of joining us in June. . . . A recent letter from Professor **Phelps Swett, I**, states that he and Mrs. Swett are invited to a special gathering at Middlebury College in Vermont on the same dates as our Reunion. The class of 1917 celebrates their 50th reunion at the College; and as Phelps is the only living member of the faculty that taught this class who can attend, he considers that this reunion should take precedence over ours. . . . **Bill Otis, I**, had written that he expected to attend our Reunion thinking it would be held at Oyster Harbors which is not far from his summer home in Chatham. He questions now whether he will be able to make Cambridge due to his physical condition. . . . In the February issue of Technology Review there is a fine obituary notice on page 47 for Professor **Ralph Hudson, '07**, Course VI. Our class notes for March 1967 contain additional information relative to our classmate. This is the first set of notes for many months in which no deaths of '07 men have to be recorded. . . . I want the class to know that I have appreciated very, very much the many words of thanks that came to me on our Reunion questionnaire relative to the way that the Secretary and Treasurer's duties are being conducted.—**Philip B. Walker**, Secretary and Treasurer, 18 Summit Street, Whitinsville, Mass.; **Gardner S. Gould**, Assistant Secretary, 409 Highland Street, Newtonville, Mass.

'08

In the January issue I reported the death of **Ira G. Hersey**. Since then I have obtained the following newspaper clipping which will be of interest. "Services for Ira G. Hersey, Jr., 79, of 263 Elm Street, Braintree, a South Shore builder, will be held at 1 p.m. Friday, November 11. Born in Boston, he was raised in Hingham and was graduated from M.I.T. as a construction engineer. He worked with the Erie Railroad, then joined his father in the Boston building firm of Ira G. Hersey and Sons. From 1932 to 1956 he was a construction consultant for the Home Savings Bank. He was president of the Pioneer Cooperative Bank of Boston and chairman of the board of the Hingham Mutual Fire Insurance Company. He was also a life member and past president of the Master Builders Association and was a life member of the Massachusetts Charitable Mechanics Association."

Deceased

- ROGER W. BABSON, '98, March 9
EUGENE W. RUTHERFORD, '98, February 19
WADE L. WETMORE, '02, September
LOUIS W. GRAVES, '03, December 28
ANDREW H. HEPBURN, '03, February 28
RALPH C. JORDAN, '03, June
JOHN C. DAMON, '05, March 8*
JOSEPH DANIELS, '05, January 20*
ALPHONSUS O'FARRELL, '06, February 3
ROBERT I. HULSIZER, '09, December 25
HAROLD F. PARSONS, '10, February 14
MARTIN S. TOD, '10, March
DAVID P. ALLEN, '11, February 27*
ARNOLD CHANDLER, '14, February 24
ALDEN CRANKSHAW, '14, February 20
HAROLD J. DANFORTH, '14, January 12
CHESTER M. RUNELS, '15, March 1*
EDWARD L. SULLIVAN, '15, January 21*
JOHN F. HOGAN, '16, February 16
EDWARD H. WILLIAMS, '16, February 23*
THOMAS L. BLAKEMORE, '17, January 13*
ALBERT R. MUMFORD, '18*
EYLER BROWN, '22, January 18*
EDWIN A. TERKELSEN, '22, February 28*
THEODORE M. KUSS, '25, February 6*
WALTER D. MCCREA, '25, March 7
CARMER CRISWELL, '28, February 28
M. MAXWELL BOWER, '30, April
MADISON M. CANNON, Jr., '31, January 23*
VLADIMIR A. SEMION, '31, February 12*
MAURICE COOK, '32, November 15
GERALD C. WOLPIN, '66, February 13

*Further information in Class Notes.

We will celebrate our 59th Reunion at Melrose Inn, Harwichport, Mass., June 9, 10, 11, returning for Alumni Day at Cambridge June 12. Plan to join us.—**H. L. Carter**, Secretary, 14 Roslyn Road, Waban, Mass. 02168; **Joseph W. Wattles**, Treasurer, 26 Bullard Road, Weston, Mass. 02193

'11

Roy MacPherson says he is beginning to see again with temporary lenses following the completion of his cataract operation. In January he attended the dedication of the auditorium in the new one and a quarter million dollar nurses' home at the Framingham Union Hospital which was named in honor of Roy's father. . . . A letter from **Harry Tisdale** by way of O. W. Stewart says he seldom leaves his home at Fort Meyers Beach, Fla., but had a call from **Phil Caldwell** and his wife who took him out to lunch. Harry has joined the local chapter of the AARP and has been made their treasurer. . . . **O. W. Stewart** says he is back to the quiet life in Kingston after a three-week trip to Kenya in January. He visited his youngest son in Nairobi who is on the faculty of the Kenyatta Teachers Training College and a lecturer in geography at the University of Kenya. Quoting O. W., "Enroute we stopped off for a few days in Rome and Cairo. Wonderful. Next to finding the young folks well and everybody happy, our chief attraction was the animals. The game management in Kenya and Uganda seems excellent via several large national

game parks. It surely promotes tourism, which is now second only to the coffee crop as a source of national income in Kenya. One of the high spots was a 500-mile plane trip from Nairobi to Murchison's Falls on the Victoria Nile. There on a twenty-mile launch ride up to the falls, we photographers with telephoto lenses had a field day shooting elephants, zebras, crocodiles, giraffes, hippos and other wildlife." . . . **Harold Daniels** was honored at a dinner held in the Megeron at the Worcester Academy on March 9. The following is from the Worcester *Daily Telegram* of March 2: "Daniels headed a foundation named for his father which retired Worcester Academy's \$33525 mortgage in 1950. The academy gymnasium is named after him. Daniels was elected chairman of the academy's board of trustees in 1965 after having served as board president since 1939. He previously served as vice-president and secretary. He has been a trustee of the Peoples Saving Bank and a director of Mechanics National Bank and State Mutual Life Assurance Company, and a trustee of Worcester Polytechnic Institute and Nichols College." Daniel's life work was with the Riley Stoker Corporation of which he was president and chairman.

I have to report the recent death of **Gordon Glazier** of Concord, Mass. He was a native of Cambridge and was president of the Jones, MacDuffie and Stratton store in Boston. Later he became vice-president and comptroller of Hollingsworth, Whitney and Company. At one time he was president of Wiggin Terminal Company of Charlestown. He is survived by his wife Gertrude, one son and three daughters. . . . **David P. Allen** (Dippy) died on February 27 from the last of a series of shocks that he suffered over the past five years. He was a native of Saxonville, Mass., and after graduation went to work for the gas company in Des Moines. A few years later he transferred to the gas company in Washington where he became superintendent of distribution. He is survived by his wife Mary, one son and one daughter. . . . **Theodorus Polhemus** died of a heart attack at his home in Tucson, Ariz., February 12. From his daughter Margaret Blair I learned that after graduation he was employed by the Canadian Pacific Railroad in a number of supervisory capacities. He then took a position as a mining engineer with the New Jersey Zinc Company. Following this until his retirement he was self-employed in a number of enterprises.—**Oberlin S. Clark**, Secretary, 50 Leonard Rd., North Weymouth, Mass. 02191

'12

John P. Scogin, Jr., passed away on July 16, 1966, at his home 13825 Payton Street, Dallas 75240. . . . Captain **Philip Lauman** passed away on January 22, 1967. He was living at the MarSelle, 2131 O Street, N.W. Washington, D.C. 20037. . . . **Earl Ferry**, whom you all remember as our cross-country runner, passed away in Pittsfield, Mass., where he had lived since graduation. He entered his father's

firm of C. S. Ferry & Son Lumber Company, of which he later became president and remained so until his death. He was a flier in World War I and with other Pittsfield citizens purchased land for the local airport which was afterwards deeded to the city. He remained an active amateur flier for many years. He was active in philanthropic activities in Pittsfield being in the Boy Scouts, local church and Masonic orders.

In talking with **Philip Dalrymple** the other day I find that he has just resigned as one of the trustees of the Andover Newton Theological Seminary. Phil is still an active member of the Jackson Moreland Company in Boston. . . . **Fred Busby** was in the hospital at Christmas time for a minor operation but is now back teaching at the Manter Hall School in Harvard Square. His specialty is mathematics. . . . While in St. Louis I had a pleasant telephone conversation with **Marcel Desloge** who is living at 4616 Lindell Boulevard, St. Louis. Marcel and his brother Joe both graduated with us and have been active in the Killark Electric Manufacturing Company, St. Louis, until their recent retirement. Marcel would like to come on to the reunion but tells me his health has prevented his traveling much in recent times. . . . I enjoyed a pleasant evening with **George Sprowles** last week. George is director of research for Tyrex Inc. located in Akron. This non-profit organization is supported by several large tire yarn manufacturers, and George went with them after 45 years with the Goodyear Electric Company soon after his retirement in 1957. He travels something over 100,000 miles a year which to my mind is being fairly active. He is in the best of health, and we had a good visit after dinner.—**Frederick J. Shepard, Jr.**, Secretary, 31 Chestnut Street, Boston, Mass. 02108; **John Noyes**, Assistant Secretary, 3326 Shorecrest Drive, Dallas, Texas 10145

'13

The town election in Canton, Mass., has passed and we are in the throes of many town meetings. It is hoped that now we can report regularly to our classmates. The Capen family was very much involved, and we are happy to report that our town has a Republican majority on the board of selectmen for the first time in nearly 20 years. Your Scribe is a member of the Norfolk County Republican Club and is serving on the executive committee. Also he reorganized this club in 1936 and 1937. Further, he was honored last Saturday at a "work shop" meeting when an inscribed plaque was presented to him by the Canton Committee, the Norfolk Club signed by Governor Volpe, the secretary of state "for 50 years service locally, county-wise, state and nationally in Republican organizations." . . . **Jack Farwell** writes: "For the 55th Reunion, Oyster Harbors Club. Otherwise we might experience another reunion like the Motel 128. If a classmate can move or be moved, he could make Oyster Harbors with the advantages and away from the cities. It was with regret that I learned from your

letter that several had suggested the reunion nearer Cambridge. As to your letter relative to 'changes in pursuits and occupations,' mine haven't been much. Since the loss of Jeannie last year I haven't had any interest in traveling. Have acquired additional equipment and am doing more land clearing, building improvements etc. Haven't given way to the young yet in operating tractors with mowers on several acres and chain saws. I'm living alone with a labrador retriever. **Gene MacDonald** gave me a phone call recently, and we had a get-together at lunch. Ellen and **Bill Brewster** who are leaving on a cruise in March suggested I go along on the same cruise, but I decided not to. Hope you are extracting some news from classmates who have more to report than I do because I look forward to reading your class notes in the Review. You are very busy I can see on your new job. Trusting you are all well. I am leaving December 19 to visit with my sister in Saint Cloud, Fla., and when there I usually drop in to see Esther Rand who lives in the same town; in former years I would visit with Harold Rand. Just a short trip and back here December 30, why I don't know. There shouldn't be any attraction from snow and ice vs. Florida sunshine." . . . We received a very interesting letter from **Ed Hurst** following our notes and we quote in part: "Please accept my most sincere thanks for the tribute paid my beloved in the 1913 class notes for December. Last evening I phoned **Arthur Hirst** for the letter he wrote you and so nicely worded." Ed is working on a machine he invented which will enable blind children to earn \$5.00 to \$10.00 per day. It will enable them to make 100 or more useful things using only the sense of feeling. The Perkins School for the Blind was Harriet's favorite charity, and so Ed will establish a memorial to her by providing or donating one of these machines to the school. Ed, your classmates salute you for your ability and endeavors.

The Capens exchanged Christmas cards with many of our classmates and their families. To mention a few: **Polly and Lee Parsons** and the **Robert Bonneys**. The greetings from the Bonneys was exceptionally heart-warming. After all the trials and tribulations concerning Bob, they are very pleasantly located in a warm and tropical climate in Palo Alto, Calif. We quote in part: "We are hoping that in these nice surroundings and pleasant climate we shall be in better shape by spring." It is hoped that if any of you are anywhere in the vicinity of Apartment 601, Casa Real, 360 Forest Avenue, Palo Alto, Calif. 94301, that you will visit the Bonneys and enjoy the company of Bob and Imogene as the Capens did last summer. . . . It was a pleasure to hear from **Lammie Lemaire** and we quote: "The new year is upon us and I cannot let it go longer without sending you my best wishes for a satisfactory one replete with good health and prosperity for you and your charming lady, Rosalind. Heartiest congratulations on your achievements. You are completely out of my class with your 98.4% marks and your many activities in Rotary and Canton mapping and redevelopment. If you have a spare copy of the brochure

handy, you might post me one, and go down in history as a contributor to modern development. You make me feel very important with my humble research into the facility of arts, which you probably term humanities. During the last two years I have been attending (Townsville) University College lectures in English, education, psychology, French, European history to 1815 and Australian history. The work has embraced occasional lectures by myself, but has been very interesting and certainly fills in my declining years. My youngest, Peter, has just been granted his master of agricultural science and the oldest a bachelor of law, also should get his masters in 1967. Our term here starts in February, and at present I am 200 miles south in Adelaide so will have to start soon. I am following your example, visiting with my family in Adelaide, Melbourne and Sidney. Enough for now. All the best to you, and the class of '13."

Bill Mattson certainly really writes when he takes that pen in hand. He and Joe surely do enjoy life, traveling and a continuous round of social activities. Bill is still an outstanding Republican and assisted in electing a Republican majority in Colorado. Last winter the Mattsons enjoyed a two-month vacation which included: a 10-day auto trip to New Orleans where they participated in the sights and deep south meals; a 16-day Caribbean cruise to Nassau, San Juan, St. Thomas, Curacao, Kingston, Grand Cayman; from New Orleans by car a visit in California, stopping with friends en route at Los Angeles; then up the coast to San Francisco, spending a week with their daughter, Janet. Joe and Bill returned to Denver via Salt Lake and over the Rocky Mountains. **Arry and Larry Hart** spent a month with the Mattsons in June. Again in August the Mattsons were on the road. They drove to Gallup, N.M., 150 miles, for the Indian ceremonial dances. They think nothing of driving for lunch or dinner to Colorado Springs (150 miles round trip) or Torrington, Wyo. Bill states that he enjoys his western life but does miss his eastern friends. We thank him very much for the invitation to the Capens to spend a month with them. Beware, Bill, for maybe someday the Capens will knock on your door. Bill, also our ambassador in the Rocky Mountains, called Mrs. **Arnold F. Rich** extending the sympathy of the class of '13 following the death of our classmate, Arnold. . . . **Howard Currier** forwards a clipping: "A class reunion is where you get together to see who is falling apart." He adds: "Enclosed clipping would be apropos for any alumni reunion, maybe our '68 one will be typical. For myself, I still have hopes of being able to make it." We shall be looking forward to greeting the Curriers. . . . The regular yearly post card from **Dave Nason** in the Barbadoes has been received. . . . More from other members in the class: **Ralph B. Kennard**, 3017 Military Road, Washington, D.C. 20015; wife, Allie Gene; children: Frances Kennard Wolf and Margaret Gene Jenkins; grandchildren: Barbara Wolf, Deborah and Priscilla Jenkins, Patricia Jenkins, Roberta Jenkins, Cynthia Jenkins, Katherine Wolf; affiliations: Catholic Univer-

sity, "applied optics," National Bureau of Standards; hobby: photography. . . . **Kenneth D. Hamilton**, 224 Crystal Lake Avenue, Audubon, N.J. 08106; wife, Claire; children: John S. Hamilton, Benjamin S. Hamilton; grandchildren: Steve Hamilton, Heidi Hamilton, Henry Hamilton, Pixie Hamilton, Susan Hamilton, Debra Hamilton; activities: keeping healthy, eating and plenty of sleep; hobbies: same as activities—too old for baseball, football and track, etc. . . . **Earle R. Lincoln**, Box P.O. 65, San Josef P.O., San Josef, B.C. He is still single and is employed by the Department of National Defense of Canada. . . .

Well so long for now, until June.—**George Philip Capen**, Secretary and Treasurer, 60 Everett St., Canton, Mass. 02021

'14

This is written in mid-March, and we have just been gossiping with Lois and **Hugh Chatfield** about their plans to take off to Florida in a couple of weeks with their 11-year-old daughter Debby who has a spring school vacation. They will see the **Charlie Fiskes** who, as you know, now have a home in Florida as well as in Maine. It must be a youthful feeling to talk about 11-year-old children when most of us have 20-year, and more, -old grandchildren in and out of college. . . . Some correspondence with **Lin Faunce** is letterheaded Treasurer of the Hartford Association of Congregational Christian Churches and Ministers. We know that Lin also has town and other social interests, but it is interesting that so many of our retired classmates have active church contacts, most likely that they have more time for such work now that the money-grubbing period of life has tapered off. Or could it be because this will assure them a better position in the social order in the Great Beyond. Say not so! . . . Let's get off this discussion into something more earthy and forward looking. **Ray Dinsmore** is sending out feelers for ideas on our 55th Reunion in '69, where and what and its relation to Alumni Day. Drop Ray a line if you have any ideas. Those of you who can get to Alumni Day in June '67 may find this an interesting subject for discussion at the luncheon table. We will try to be there. . . . It's surprising to what ends some people will go in order to keep in the news notes. Here's **Alden Waitt**, after an art exhibit of distinction, now just out of the hospital after surgery. Take it easy Alden. . . . In addition to those already mentioned we have seen or talked to Rich and **Les Hamilton**. Les, as we have noted previously, still has an office at the Institute where he is executive officer of the Chemistry Department. . . . And just a final word about the desirability of getting back to Alumni Day. The Boston area may not still be the hub of the universe and Scollay Square is no more, but the influence of the institutions of learning, particularly M.I.T., has resulted in the establishment of at least 200 new technical industries, particularly along Route 128, in the last couple of decades. This was the subject of a recent

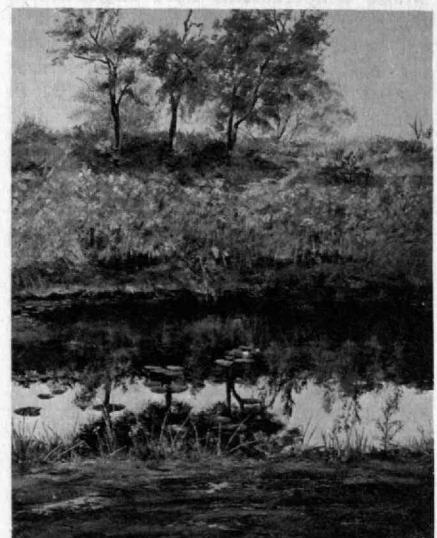
Alumni Council session.—**Herman A. Affel**, Secretary, Rome, Maine, mail: RFD 2, Oakland, Maine 04963

'15

I never thought it could nor would happen, but it has. The old Pirate himself **George Tarpaper Rooney**, went in for surgery about February 1. After a long, tough experience he is back in circulation, his skull and cross-bones banner flipping in the breeze and his boarding pistols and cutlasses ready for any attack. Again our class proves itself supreme. The letters, cards, phone calls, flowers and messages you fellows deluged on George were a great help in cheering him and encouraging him to a comfortable hospital stay and a sure recovery from a serious situation. He and Ethel appreciate it deeply with their thanks. This all happened while Fran and I were on our South American cruise, but several fellows wrote us about George's progress. **Archie Morrison** wrote about George and **Easty Weaver** who still is in the hospital and not doing too well. **Al Sampson** wrote that George's operation was successful and that he soon had a glint in his eyes for the nurses. Then, two big thrills, at sea between Barbadoes and

This painting ("Lily Pond," Fort Sam Houston) is one of 37 landscapes by Alden H. Waitt, '14, exhibited this winter at the Marion Koogler McNay Art Institute in San Antonio. Major General Waitt, formerly chief of the Chemical Division of the U.S. Army, is now a full-time artist, president and director of the San Antonio Art Institute, and an active figure in Texas art circles. He approaches his canvases, said Sue Fuller writing in the McNay Art Institute program, "with all the skill, power and discipline gained in his former profession. . . . He maintains the rigorous vigor of observation and precise delineation. . . . Yet in full scientific awareness of natural phenomena, a keen and discerning mind, eye and heart have selected and composed what nature offered."

PHOTO: MARION KOUGLER MCNAY ART INSTITUTION



the Virgin Islands we received a radio-gram from **Jac Sindler**, "George Rooney doing fine," and a few days later off the Florida coast we had a radio phone call from **Big Ben Neal** asking about George. Ben was at a convention in Miami. A fine, friendly crowd of classmates. . . . **Reggie Foster** is back in the Lowell General Hospital, this time for surgery. We all wish him well. He surely has had more than his share of trouble and suffering. . . . After leaving the Massachusetts General Hospital in Boston around New Years **Phil Alger** had to go to the hospital in Schenectady on January 25. He wrote: "I appreciated very much your sympathy and good wishes during my 8-week stay in two hospitals. It was very helpful to have notes to read and cards for decorating the room. I came home on January 20, and now I am trying to regain some energy. After being flat for so long, it is very remarkable how difficult and fatiguing going up stairs, and even walking about, are. My chief occupation at the moment is doing jigsaw puzzles, but reading and writing are gradually becoming more attractive, and telephone calls provide pleasant interludes. It will probably take several weeks before I can get back into the swing of things, and next summer I shall need to have another bit of surgery. But by next fall I expect to be in very good shape." We are all glad for Phil's recovery and do hope that he won't have to face additional hospitalization next summer.

If you haven't paid your class dues, how about it? . . . The **Ken Boyntons** are on the *Sagafjord* on a South Pacific cruise, and from somewhere down under beyond Bora Bora Ken wrote they were having an interesting trip. From Naples, Fla., **Jerry Coldwell** wrote that Verta and he were glad to be away from the February snow storms (so were we!). . . . After 19 years as moderator of the West Tisbury (Martha's Vineyard, Mass.) town meeting, **Charlie Norton** has resigned. The Vineyard Gazette paid Charlie a nice tribute: "Mr. Norton has exercised an always good humored jurisdiction over debates on many important and controversial subjects, exemplifying the sort of chairmanship that fulfills the meaning of the term 'moderator.' He belongs in the tradition of West Tisbury town officials whose temperaments have characterized the even course of the town." . . . It is sad to report the passing of two outstanding classmates, each after a long, serious illness. **Ed Sullivan** died January 21 in South Boston, and **Chet Runels** died March 1 in Lowell. The attendance of class representatives at their services and the memorials we sent are only small expressions of our deep regard for these men. They were active, loyal and interested supporters of all M.I.T. and class affairs. We'll miss them a lot. Our sincere sympathy goes to their families. . . . You, your families and your guests are all invited to our annual class cocktail party at 4:00 on the afternoon of Alumni Day, June 12, at the M.I.T. Faculty Club. This year for your convenience our class dinner following the cocktail party will be in the Faculty Club dining room so all you'll have to do is go out of our cocktail party into the dining room, no buses, no walk-

ing. Al and Barbara expect to see you all there and so do I.—**Azel W. Mack**, Secretary, 100 Memorial Drive, Cambridge, Mass. 02142

'16

"Where can I buy a cow catcher to attach to my new car?" writes **Stewart Keith** from his Denver address. He explains: "I fought a bullock with my auto. Now I have a new car and the ranch has one less animal. Now what I wish to know is. . . ." and that is the opening question above! Probably the knowing answer that our president, **Ralph Fletcher**, would give is: "Come to the 51st Reunion. All questions answered and all problems solved." In fact Ralph does have something to say as an opener at this time as we go to press: "We are happy to report that the early returns on attendance at our 51st Reunion are very encouraging. Even with many of our regulars still not heard from, we are assured of an excellent turnout. If you are planning to attend and haven't already responded, please let us hear from you so that we will be timely in making adequate reservations. For those of you who may still be 'on the fence,' let us know of the possibility that you may attend so we can provide the necessary cushion in our advance reservations. All best wishes, and we look forward to seeing many of you on our June 9-10-11 weekend at the Chatham Bars Inn on Cape Cod." . . . Just now in early March **Howard Claussen** of Cotuit, Cape Cod, writes that he has had enough weather! He says: "Be glad when this winter is over. My boat goes in the water April 15, oh boy!" . . . And at this writing we understand that Jess and **Steve Brophy** are on the high seas in the Pacific, on a Matson Line South Pacific Cruise that includes Papeete in Tahiti, then Auckland, Sydney, New Caledonia, Fiji, Pago Pago in American Samoa, Honolulu, and a week in San Francisco before getting home near the end of April. . . . Dolly and **Peb Stone** are off on one of their favorite Caribbean jaunts with stop-stay after stop-stay after stop-stay. From their first stop in Barbados, B.W.I., Peb writes of a familiar sparkling contact that many of us still think of as a '16er: "Had a very pleasant rum-and-cake with George Kittridge, '17, and his wife. He looks in the pink with the old mustache the same but white. He's just finished something about a \$2 million hospital and is busy with horses around the island. Sends special greetings to **Dina Coleman** and **Irv McDaniel**." . . . And **Don Webster** tells **Jim Evans** of his many Tech contacts in Palma de Mallorca, Baleares (islands), Spain, saying: "Nell and I are back in our old pet town for the late winter until April 11. Then back by ship via Sardinia, Naples, Rome, Cannes, Barcelona, Alicante, Gibralta, Madeira. We have quite a Tech delegation here: Paul Cummings, '07, Lew Southwick, '10, Ken Bell, '17, and Dex Tutein, '17." . . . As for other foreign travelers, we understand that right now Irv and Kay McDaniel are getting their shots and will be off into the Pacific,

partly we hope to provide us with exciting new copy on the Orient. We'll never forget Irv's 1962 account of what was going on, and about to go on, in Egypt and up the Nile.

While reporting these away-from-home items, we are reminded that we have a back-home couple, Gypsy and **Cy Guething**, who have finished their 7-week avoidance of Detroit snow in their favorite winter haunt, Harbour Island in the Bahamas. Cy talks about getting into the garden house soon and doing something like sharpening up all his shovels, rakes, and asparagus knives so as to be sure he is ready when spring really comes. But he did have one frightening experience on Harbour Island, an encounter with four semi-wild horses that roam the island. As he tells it: "One had a broken hackamore [look it up in the dictionary; we did. Sec.] tight around its neck and dangling on the ground, on which it was tripping and tightening the noose. Feeling sorry for its plight I approached, scratched its head and reached for the rope. Oh no! Its ears flattened back, and for my age I made a hasty start for other places. Just to help the horse let fly and its unshod hooves planted themselves right on me! Luckily the ground was soft for I was propelled nose first into it. Six inches higher and my spine would have been shattered." We are glad Cy is still safely with us, and can almost hear him saying: "Be careful about being kind to semi-wild horses." . . . **Vert Young** writes in early February: "I have gotten myself into a peck of trouble, me thinks!" He says that in a moment of rashness he wrote to a couple in South Africa "whom we had met on our 1963 trip, suggesting that they send me a consignment of stichlite which I would endeavor to market for them on a 50-50 basis after deducting expenses. This is a beautiful mineral that occurs only in a limited area of South Africa, Tasmania and Morocco and is practically unknown in this country. It is purple in color and appears with green serpentine, making very attractive specimens, and also suitable for working up into bolo ties, pendants, and embedding in resin to make very attractive table tops. A consignment of 1900 pounds arrived just before Christmas, and since then I have been busily engaged in scrubbing, sorting, grading, and cutting the mineral. It will be advertised in the next issue of the magazine *Rocks and Minerals*, and yours truly will be busy from now on until the 1900 pounds are hopefully disposed of. (P.S.: this is not a commercial!). When the May issue comes out, the absence or presence of responses will be the best disproof or proof of my sagacity! "Vert also tells of just having had a telephone call from **Art Shuey**, then a good over-night visit. "He used to live in this vicinity long before I arrived on the scene. He is a most pleasant companion, and we are talking about going on a freighter down the west coast of South America this summer. Art looks fine and we thoroughly enjoyed his visit, with a little dinner party in his honor. He gave me about eight copies of a little book of poems that his wife had published a year or so ago before her untimely death, *Some Kentuckians and Other People* by Mary

Willis Shuey. I am sending one to you and Grace. The poems, I think, are delightful and I hope you will enjoy them."

Since his second retirement, **George Maverick** says he keeps busy on the woods and roads they call Shepherds Hill Farm, and on the Virginia Association for Mental Health. In February he said the latter had just lost its paid executive director and "I am spending much time to find his successor while continuing in a campaign to improve Virginia's Department of Mental Hygiene and Hospitals. Wish I were a better politician. Ruth and I have our golden wedding anniversary in July, and we hope things work out so that we can drive home to San Antonio to celebrate it. My parents' golden anniversary there at Sunshine Ranch in 1927 set a Maverick family pattern that involves complications for us. Our nine grandchildren and single great grandchild live mostly around New York and Boston, so there's a problem of logistics." . . . **George Hale** writes from Golden, Colo., about his stay of a month or more last summer at a cottage on the shore of a small lake in the vicinity of Traverse City, Mich. "From time to time the grandchildren, who were most always in or on the water, would find Petoskey stones. These are fossilized remains of the coral hexagonaria and other corals and sea animals. They grew here about 200 million years ago when this area was a tropical sea. Since the fossils are in relatively soft limestone, I have enjoyed hand polishing several with wet silicon carbide sandpaper. I am told that Petoskey stones are found only in the upper part of Lower Michigan. Sleeping Bear Sanddunes cover a large fossil bed." . . . We are the recipient of the Vol. III, No. 1, issue of the *Southwest News* published in Tucson, Ariz., Virginia Connolly, Editor, and **Joel I. Connolly**, Publisher. This unusual issue gives a number of interesting bits about Virginia and Joel's trip to the Orient (Japan, Taiwan, Hong Kong, Manila, Sydney, and Mosman, Australia). The Connollys sailed on a Chinese freighter, the *Union Concord*, from Houston, through the Panama Canal to Yokohama. There were eight passengers aboard, and they were the only two persons on the ship who were not Chinese. Joel attended Rotary Club meetings in Hong Kong and in Mosman, Australia (the only Rotary Club in the world that meets in a zoo). Another item: "When our return ship, the SS *Monterey*, crossed the equator in Mid-Pacific Ocean, its passengers were encouraged to toss bottles containing notes overboard. We did so, along with many others. About seven months later we received a note stating that our bottle had been found 2,100 miles to the west on Nissan Island. It seems to have floated, in a general way, along the course taken by Magellan in 1521 in the first circumnavigation of the earth. The finder, like Joel, was a sanitary engineer. The captain of the ship was duly notified. He sent the information along to the U.S. Navy." For your copy of more interesting reading, write Joel, Box 17132, Tucson, 85710.

Allen Pettee, writing from Tryon, N.C., gives pause with his opening paragraph: "Your call for copy keeps me awake. Last night I even got started on a coat of arms

for you, but I got no further than a beneficent beaver rampant on Charles River Basin with postage stamps sinister on your flat tail and a motto of *Vive en Espoir* or even *Gubernatio Qualitatis*, except that my French and Latin are very rusty." But then Allen comes out with some lively first-hand information on a retirement haven: "One of the queries around here is 'how did you happen to come here?' i.e., Tryon, N.C. This leaves one in a quandary. Did your interlocutor mean (a) 'how did you discover this delightful hide-away' or (b) 'how did you stumble on this dump?' It's safer to assume (a) of course and 99 out of 100 that is right. Perhaps Donald Culross Peattie has had something to do with it, for he, dogmatically almost, affirmed that Tryon, Carmel, Estes Park, and Marblehead were the places for retirement. [Hazel and **Bob Crosby**, please note.] Whatever it is, there is a steady flow of replacements from the North with enough excess to keep four or five building contractors comfortably busy building more comfortable homes. Anyone with a horse, a greenish thumb, a few golf clubs, well-worn hiking boots, a dog-eared Goren and Roger Tory Peterson, bifocals and/or a touch of arthritis should be able to make out." . . . From Largo, Fla., comes this word from **Dick Knowland**: "First of all I would comment on the masterly handling of the reunion in June. Everything connected with its conception and execution must have involved an immense amount of labor. The blazers were gorgeous, and I enjoyed the unaccustomed distinction of displaying the Tech colors with red jacket and gray hair, thanks to the unknown-to-me givers. It was good to see so many old friends, with the majority of whom our paths had not crossed in many a year." Dick says they have sold their house in the Berkshires and are now concentrating in Florida where they are building a new one: "This takes a bit of optimism in the days of one's antiquity. However, we have a son and his family living close by, and this makes a difference. The family remains as at last reporting: three sons and their wives and seven grandchildren. The distribution includes Ithaca, Williamstown, Mass., and Largo. The infants, in four instances, are entering college or close to it. These latter do our old hearts good by being on the honor roll, whatever that consists of in these days. Casting an eye on men of distinction in the political world, I almost hope that, should any attain distinction, it will not be in the world of politics. The granddaughter majors in Russian and, whatever happens, I do like caviar." . . .

In early March **Francis Stern** reported the finest six weeks they've ever had in Palm Springs, with the last four between 70 and 85 degrees daily. But: "This town has been badly hurt by tight money. Normally many real estate transfers occur, as people buy-resell in two or three years instead of renting. Banks have been unwilling to renew or extend mortgages except at a high rate. Result: many empty places, even stores. January was extremely quiet; now, at mid-season, comfortably filled. Not very exciting but at our age good health, good appetites, and good reading are pleasures enough." Francis keeps up

his contacts in Junior Achievement and flew East in January for executive committee meetings. . . . **Harry Smith** writes from Chatham, N.J., "Since the big reunion last June things have been relatively quiet at this establishment. We did manage to get in an auto trip out to see friends in La Grange, Ill., last October. Locally the 'Old Guard' of Summit helps a lot to keep things from getting too dull, with weekly meetings and bridge contests twice a month. Dot and I hope and expect to make the 51st." . . . And speaking of reunions, we wish we had heard from **Bob Diemer** of Buffalo a year ago for he has sent us a beautiful picture, in post card form, that he took in June 1916 of the *Bucintaur* at the M.I.T. dock in the Charles River Basin at the dedication of the new M.I.T. buildings. The picture will be on display at the 51st in June. In 1918 Bob had a brief sojourn at M.I.T. with the U.S. Naval Aviation attachment and was quartered in the Walker Memorial Building. (Some may recall this as the building whose 1st floor-to-cellars broad stairs were used for many years at noon as the gathering place for a score or more lunch box-carrying commuters.) Bob says he and his wife are planning to stay in Buffalo. "I'm now retired after a widely varied career which included engineering jobs and electronic sales work among other things. My hobbies are mainly piano playing, records and tape machines. In recent years I became blind from cataracts. Two years ago I had both eyes successfully operated on, and I can now see again for which, needless to say, I am very thankful." . . . **Wes Blank** writes from Charlottesville, Va., that he was disturbed to hear of **Obie Pyle**'s death. He says Obie and **Bill Liddell** were his closest friends, and that he and Bill were tentmates at East Machias surveying camp. Then: "I sold my large country home with its 160 acres overlooking the Blue Ridge Mountains of Virginia and am now in a new ranch house with 2/3 acre, but still with a mountain view. My wife and I anticipate our last tour through Southern Europe in June, visiting Portugal, Spain, French Riviera, Northern Italy, and Austria. My hobbies are still bridge, chess, and philately, being an A.P.S. member. Recently I found the recorded moves in the 1913 Harvard-Tech chess match wherein I played board #4 white against J. R. Morton, a Harvard law student, and defeated him in 34 moves by a pawn checkmate. I still find a member in our Farmington Country Club who plays chess and like me has retired from golf."

From Noroton, Conn., comes word from the **Merrick Monroes**. Retirement started in 1965 and they plan to stay in Noroton. Two years ago they attended their son John's graduation from Pomona College in Claremont, Calif., and the five-week trip included many of the National Parks in the West. "John was married last August, and he is in his first year in Jefferson Medical, Philadelphia, where he and his wife live. She is a graduate nurse and works at the U. of Pa. Clinic." Last March the Monroes had 12 days in Mexico, and this fall they expect to take a look at Scandinavia, England, Ireland, Scotland and Wales. "Mrs. Monroe has

been taking some night courses at the Darien High School, water color and ceramics; I have been taking a course in investments and one in Asian studies, most interesting. In about a month it will be time to get out into the yard again. So life goes on in a low key, low-compulsion course. I would emphasize the passage of time with the old saying: 'Gather the rosebuds while ye may, for time is fast a-fleeting.' When I entered high school I remember wondering how there could possibly be time enough to extend four years into the future. Now I look back and say what future? However, unlike Lot's wife in the Bible, we don't look back—much." . . .

Berthoud Boulton in St. Louis explains: "For the past six weeks I have been engaged in the fascinating work of building a sailboat, laying down the lines full-scale and making the innumerable parts of oak and mahogany. Assembly will start in early May when we open our home on Lake Montowese. Now you know why I haven't sent in these notes sooner." And he says his health continues to be "almost disgracefully good. At age 73 one should really be slightly decrepit. My 2nd semester of teaching dynamics is well under way with a good class. This plus my Red Cross volunteer work and a few other little jobs keep me out of serious mischief. I become more convinced that the secret of a satisfactory retirement is being busy and try to contribute a fair amount of personal effort to lend a hand to others."

We regret to report the death of **Edward H. Williams** of North Falmouth on the 23rd of February after a long illness. Because of a heart condition he had been unable to attend reunions on Cape Cod but kept in touch by telephone at reunion times and regularly contributed his paragraph or two in the class column whenever he was asked. His professional career was concerned with fire protection and insurance with the Factory Mutual System. He started with their engineering department in 1916 and retired in 1958 after serving 15 years as president and five years as chairman of one of the Factory Mutual Companies [the Industrial Mutual Insurance Company of Boston, someone writes]. In the 50th Reunion biography this is what he said gave him the greatest satisfaction in his work: "The progress of the art of fire protection even into the early nuclear plants, and the part the industry played in keeping abreast of the production hazards in the ever-increasing output of manufacturing plants and the rapid conversion from peacetime to war output. In addition were the advances made in the policy coverages furnished to the insured." As Howard Claussen says: "To his friends he was a quiet, loyal, genial person. His prolonged illness was a great loss to M.I.T. as it cut short what could have been an even more illustrious career." We will all miss Ed and his ready participation in the 1916 notes. . . . In his last brief illness in January, **Bill Barrett** received a shower of letters, cards and messages from classmates everywhere. And we have the message that Mrs. Barrett wishes to express the great appreciation of the family for the many notes of cheer sent to Bill, and for the expressions of sympathy after his passing. She says,

too: "The class was one of his great loves, and he got a great deal of satisfaction and happiness from acting as 1916's Class Agent. He certainly cherished the M.I.T. chair that the class gave him at a recent reunion." He will be sorely missed. . . . Finally, we have letters from **Nat Warshaw** and **Irv McDaniel** which will be reported in the next issue. Keep in mind the monthly class luncheons at the Chemists' Club in New York, 52 East 41 Street, at noon, on the Tuesday following the first Monday of the month; those present on the heavy-snow March date were **Joe Barker**, **Walt Binger**, **Jim Evans**, and **Rudi Gruber**. And another reminder: keep in mind those 51st Reunion dates: June 9-10-11 at Chatham Bars Inn, Chatham, Cape Cod, and June 12, Alumni Day, in Cambridge. Keep your bits of news and philosophy, especially philosophy, coming in by writing a little but writing often.—**Harold F. Dodge**, Secretary, 96 Briarcliff Road, Mountain Lakes, N.J. 07046

17 50th CLASS REUNION June 9, 10, 11, and 12

Here we are at "D-1 Month" what with our 50th Reunion coming up next month! As of March 13 our mailing list numbers 354 '17ers, and according to report from Tubby who is reservation chairman, we are assured of a quorum. It will be interesting to know what the percentage of representation at Chatham Bars will be. With the widows added to the above we certainly should be a good going concern. Referring to the reunion news for our 40th held at Portsmouth, N.H.: "Dick Loengard gave a report on the status of our 50th-Year Gift Fund. Cash gifts, death insurance settlements, accrued interest and a forecasting of the cash value of the insurance in 1967, which a good number of the classmates have been carrying for the Gift, makes the foreseeable amount of about \$58,000. Beginning with last year and increasingly so for this year and the next two, many insurance policies will be paid-up. It is hoped that the payee so affected will bear in mind the 50th-Year possibilities and carry on. There are Gift possibilities by way of outright cash gifts, stock transfers and through estates. Any of your officers will be glad to furnish details." Ray Stevens, Chairman of the Fund Committee, will render an interesting report, in which no doubt inflation will be evident over the decade. . . . Supplementing the January notes we quote a letter giving additional information on the late **Kenneth W. MacPherson**, "He was really retired for many years though he worked constantly on inventions, and he did have patents on fountain pens and special inks. He was a very gentle, kindly person. He loved the out-of-doors and spent a lot of time with friends on a farm in the country. He has a brother, Doctor Donald MacPherson in Boston, and another brother, a government architect in N.Y.C. Kenneth contracted pneumonia and died very suddenly." . . . Mrs. Janice F. Blakemore, 2880 East Granville Road, Columbus, Ohio 43224, writes as of February 17, "Thomas L. Blakemore, '17, Command-

er, U.S.N.R. Retired, died January 13, 1967, of a heart attack. He was looking forward to the Reunion. I hope it will be very successful. Our son Tom, Jr., a space engineer, attended a NASA seminar at M.I.T. the summer of 1966." . . . **Louis A. Ferguson, Jr.**, of 25 North Peoria St., Chicago, Ill. 60607, died January 30, 1961. Quoting from our 30th Anniversary report, "At Institute 1913-14, Course IV. Although I did desert the Institute for better athletics and college life than was available along Boylston and Newbury Streets, I am only sorry that I could not have enjoyed some of the present environment and facilities now evident in Cambridge." . . . **Harry N. Sandell**, 1454 Beacon St., Brookline, Mass. 02146, "died in Hyannis February 25, 1967, age 75 years, husband of Helen Mead, of 167 Bay St., Oysterville, formerly of Brookline." Tubby in sending this notice comments, "Harry retired in the fall of 1965 to live the year around here in Oysterville. He had been president of the Sandell Manufacturing Company in Watertown, Mass., for many years, (waterproofing membranes) and had a lovely old cape home here, loaded with antiques, that he used summers and holidays for years. He had hardly come down here for good when his health began to fail, and finally last July he went into the hospital and had been in bed since."

Last year a memorial service on Alumni Day was held and it is to be a regular service on such days, being held in the morning in the Institute chapel. **Stan Dunning** will give the eulogy for those who have died in the past year. . . . In the April 1966 notes **George R. Duryea**, now living in Buffalo, stated his father J. Frank was still alive. The *World Journal Tribune* of New York, of January 16, 1967, comments, "J. Frank Duryea, 97, auto pioneer, dies. The groundwork for today's high-powered cars was laid back in 1893 when J. Frank Duryea, pioneer auto maker, tried out the nation's first sputtering gasoline-activated automobile. That first Duryea car of 1890 was designed by Mr. Duryea and his brother, Charles E. who died in 1938. The brothers worked on their car between 1892-94, and in 1895 won the nation's first automobile race in it. Initially Charles E. received credit as the father of the American automobile, but in 1948 the Smithsonian Institute gave Frank equal credit with his brother. It is believed that Frank also may have been the first American "to get out and get under," judging from his account of the road test of the Duryea Brothers pioneer car in Springfield, Mass., in 1893. "The car started and gathered speed as it ran the short distance of the drive to Spruce Street, where I turned to the right. This thrill was not to last, for I now noticed that the engine was beginning to labor heavily and slow down." The horseless carriage, with Frank at the tiller, stopped after 300 feet when its friction belt transmission failed. By adjusting the transmission he got the engine started again and made additional runs. In 1904 the brothers founded Steven-Duryea Company, motor car manufacturers in Springfield, Mass." This being a motor

age, the editorial in the Boston Sunday *Herald*, magazine section, of October 16, 1966 will bear quoting, "H. H. Kohlsaat, a publisher, got the idea of running a horseless carriage race through the streets of Chicago, and a purse of \$5,000 was offered. Entries for the race poured in, almost 90 of them. There were some entries which made sense, including the first American car ever to take the road successfully, the Duryea Brothers machine. The race was set for the 4th of July, 1895, but as that day approached there came the horrifying realization that most of the cars entered still existed in the imaginations of their hopeful inventors. Finally a definite date was set, Thanksgiving Day. As the months went by and interest seemed to lag, an additional \$500.00 prize was offered for a name to take the place of "Horseless Carriage," and bags of mail engulfed the *Times-Herald* office. It snowed the night before Thanksgiving Day, and there were 8" of the stuff on the streets of Chicago. Merely plowing their way to the starting line was a prodigious feat for the skinny-wheeled, flea-powered autos. And six of them made it to the starting line, one of them the Duryea. The Duryea started first at 8:55 A.M. with Frank at the tiller and an umpire beside him. The other cars were a Roger gasoline car, built by Benz in Germany, entered by R. H. Macy & Company; a Sturges electric wagon; an Electrobatt Electric, built by Morris & Salom Battery Manufacturers; a Benz gasoline car entered by H. Mueller Manufacturing Company; and another Benz entered by the De La Vergne Refrigerating Company. The Duryea's "gasoline wagon" ran surprisingly well through the snow until it had crossed the old Rush Street bridge. At that juncture the steering gear became adrift and Frank had a bit of excitement of stopping without running into anything. Feverishly working Frank got the steering fixed after a 55-minute delay in which the Roger Benz got ahead of him by 35 minutes. All the other cars except the Mueller-entered Benz had either broken down in the snow or used up the current in their batteries. Since it was a holiday, the streets were full of people and the Duryea, its engine making a happy racket, its noisy exhaust popping, its warning bell clangling, was followed through the gray November evening by a procession of sleighs to the finish line at 7:18 P.M. It had taken 10 hours and 23 minutes to cover about 54 miles. The winning name was Motocycle!"

William W. Cargill of 1030 Amalfi Drive, Pacific Palisades, Calif., writes Howard L. Melvin, Vice-president, October 24, 1966, "I laid your letter of March 21 aside and found it just this morning. It may be too late, but I will outline a little of my history. In 1917-18 I was lieutenant in the U. S. Navy, World War I. In 1919 I resigned from the Navy and worked six months for my father. August 19, 1919, I went to work for French Battery Company, later the Ray O. Vac Company of Madison, Wis. I worked for that company through various positions including president and chairman of the board until the doctor put me on the shelf in 1951, and that is where I am." . . .

Thanks to Harold Dodge, '16 Secretary, we quote, "Peb Stone, '16, writes from Barbados early in March, 'Had a very pleasant rum-and-cake with George Kittridge, '17, and his wife. He looks in the pink with the old moustache the same, but white. He has just finished something about a \$2,000,000 hospital and is busy with horses around the island.' . . . Ken Bell writes from the Hotel Saratoga, Palma De Mallorca, Espana "my daughter Mrs. Clark Honig has sent you a check for our registration and my blazer deposit. As I am chairman of the Entertainment Committee for the Reunion, I trust we will have a good room, right in the main tent at Chatham Bars. We have been here for two months building up our strength for June! Don Webster, '16; Paul Cumings, '07; Lewis Southwick, '10; and Dex Tutein, '17, are all in Palma. Take good care of yourself, Loosh, as we expect a fine report on class finances in June." Harold Dodge also confirms this Tech delegation in Palma. Maybe Dex can report more fully as a good spot for an interum '17 reunion! . . . Hartley B. Gardner, New Gloucester, Maine 04260, writes February 28, "For many months now I have been receiving the material concerning our 50th Reunion but have delayed sending in any positive statement about being present in the hope that it would be a yes. Circumstances here do not seem to be working out that way. Last May 4 my wife fell, breaking the ball in her right hipbone. Thirteen years ago she had broken her left hip, so she has had an additional problem in this instance. She was in the hospital and a nursing home until the latter part of July, and since her return home has not been able to get entirely away from using a crutch. With the difficulty in getting household help here, yours truly has had to take over a bit of the housework, and in fact unless there is a marked improvement between now and June, I could not think of leaving her, even over one night. I am enclosing a contribution check to help out on expenses, and if at a later date circumstances look more promising, I will contact you and see if arrangements can still be made. I have been looking forward to this Reunion for quite awhile, and if I do not go, I will send a message to the lucky ones."

Osgood W. Holt writes February 27, "I did enjoy seeing my write-up in the February Review as it has been the first time I believe I have been mentioned, through no fault of anyone but myself. I recently joined the Los Angeles Alumni Club and hope to attend some of their excellent meetings. If Pete Newell is coming up from Florida alone, I would like rooming with him at Chatham Bars as I knew him very well at Tech and have not seen him for a long, long time." (W. B. Newell of 3219 San Nicholas St., Tampa, Fla. 33609, has been advised). . . . Duncan MacRae, RFD Box 334, Bel Air, Md., 21014, advises, "Cannot attend Reunion and blazer not requested, but sending a check for Reunion expenses." . . . A note from Al Lunn prior to his take-off for Florida and Mexico for a week advises that Bob Mulliken may be attending the Reunion. Bob's address is Florida State University,

Tallahassee, Fla. 32302. (We are holding a blazer awaiting dimensions.) . . . J. R. Ramsey, 511 Spruce St., Plainfield, Ind., has ordered his blazer even though he cannot attend the Reunion. (Sorry. We will miss you, but like your spirit.) . . . Ras Senter, 4302 Hall St., Dallas, Texas 75219, writes, "Have just completed my Class 50th Reunion pledge. Regret I will be unable to attend, but best wishes to each and all." . . . Selden Senter, P.O. Box 1776, Shreveport, La., is also unable to attend Reunion, but contributes. . . . Ray Stevens from Ocean Terrace Apts., 1500 Gulf Shore Blvd., Naples, Fla. 33490, "Just back from a swim, [February 16] and this morning a boat ride down through Gordon Pass and the Rookery area. I recommend it all. Missed the curling, but the golf is good. Doris and Joe Littlefield are about to build south of Miami. They lunched with Dunnings and ourselves recently."

Address changes for: Charles L. Co-burn, 158 Coronado Ave., Palo Alto, Calif.; Wendell B. Ford, Indian & Lilac Rd., Vero Beach, Fla. 32960; Han H. Huang, Block A 7th Floor, 883 Kings Rd., Hong Kong. . . . Clarence K. Seely, care of Gibbs & Hill Inc., 393 7th Ave., N.Y.C. 10001; Leon R. Westbrook, 1036 West Outerdrive, Oak Ridge, Tenn. 37830. . . . Attending the March New York City luncheon were John Harper, Jim Flaherty, Enos Curtin, Dick Loengard, Bill Neuberg, and Dix Proctor. This was the first time for John and I would say he is the picture of good health, as is Jim who shuttled down from Boston, re-

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mained overnight with your Secretary and assisted in the editing of these notes. Enos reports progress on the new Madison Square Garden which should be opening come November. In the meantime he is flying to Ireland to follow the hounds, and we are hoping for a snapshot of him and his horse on a berm. Bill reported he was one of the exhibitors burned out at the McCormack Hall fire in Chicago. Signing off and will see you at the Reunion!—**C. Dix Proctor**, Secretary P.O. Box 336, Lincoln Park, N.J. 07035; **Stanley C. Dunning**, Assistant Secretary, 1572 Massachusetts Ave., Cambridge, Mass. 02138

'18

Many of us are now approaching our second childhood on the inevitable way toward the far horizon. Don't let second childhood trouble you boys. It's the second adolescence that is dubious. **Ben Ballantine** lives in the next town to us so we see him occasionally in the market place or at the Supper Club. He keeps on with his conquest of age in a well-disciplined manner. . . . News of **George Sackett**'s retirement last November from the Armstrong Rubber Company has just reached me. Forty-eight years ago he went to work for Goodyear and was immediately assigned to what he describes as "the customary first job" in those days, testing fabric for balloons to be used in France for aerial observation. In his many subsequent years with the Akron rubber firm, as readers of this column will remember, he became a specialist in retread compounding. In 1955 George moved to Armstrong as director of retread development. . . . As a happy New Year gesture, and evidence of the well-known impulse of first and second youth to go exploring, **John Poteat** sent an account of a four-month trip which took in 11 countries. "The dates which determined our schedule were the optimum time for the Holland tulip display and the midnight sun off northern Norway. These two dates were about six weeks apart so we filled the intervening time with visits to Belgium, Normandy, Brittany, Ireland, Wales and Scandinavia. After short visits with our children we lifted off the Pan Am building in a helicopter on May 1 bound for our KLM flight to Amsterdam. The heat wave in Holland brought the tulips to their peak, and beatniks in outrageous costumes swarmed like flies in squares and on monuments. It was the only place where we saw any evidence of beatniks in our whole trip. The endless fields of color, the Keukenhof Gardens, a magnificent display among trees, ponds and streams, and the flower art using the clipped blooms to portray pictures of billboard size along the roads must be seen to understand why they are so indescribably beautiful! Four days were then devoted to what used to be the Zuider Zee but is now the Ijsselmeer, a large fresh water sea created by the 1932 closing of a 22-mile dike between it and the North Sea and fed largely by the IJssel river, one of several into which the Rhine divides itself after it leaves Ger-

many. By 1978 the Dutch will have reclaimed almost 2,000,000 acres from the sea! In Rotterdam, as we observed later in every large city we visited, *The Sound of Music* was being shown to repeated full houses. Leyden held especial interest because I was named after John Robinson of Leyden who bade goodbye to the Pilgrims. We saw his church, his home and several plaques commemorating the event. The Frans Hals Museum in Haarlem, and the Rijksmuseum in Amsterdam, with the largest Rembrandt collection, make a mighty good case for the Dutch masters (not the cigars). The high point in Belgium was an opera performance of Faust in the round; we have never seen anything quite to equal it. The well-known points of interest in France were the ancient city of Rouen where Joan of Arc was burned, Omaha Beach, the Bayeaux Tapestry which pictures the conquest of England by William the Conqueror, and Mont St. Michel.

In spite of some foul weather our nine-day drive around Ireland was a jolly good time. Ireland is unpredictable! It is lush and barren, tropical and cold, sunny and very rainy, but the people are jovial and carefree. We circled all the way around Ireland from Dublin to Belfast, kissed the Blarney Stone, saw the Book of Kells at Trinity College, climbed all over the ruined abbey on the Rock of Cashel, braved the rain as we trudged over the Giant's Causeway, and enjoyed the very scenic Antrim coast. Wales was unexpectedly beautiful and mountainous. While we always sought a shady spot to eat our picnic lunch, the British parked along the road in the blazing sun and crowded the beaches in scanty beach dress. There are too many castles to enumerate but Caernarvon Castle, where the Prince of Wales is always proclaimed, was most interesting. We saw the grave of Lloyd George near Criccieth. It is a simple boulder from which he fished as a boy and the stream is just below the burial place. A small narrow gauge railroad built in 1830, with tiny red and green locomotives, took us from sea level to a slate mine in the mountains. Originally it used horses for motive power. The cars returned to sea level by gravity with the horses on board! Now headed east toward England, we stopped by Port Meirion, a conglomeration of Italian and French architecture entirely out of keeping with the rest of Wales, but it is where the Duke of Windsor, then King Edward, had his clandestine meetings with Wallis Warfield. This coast of Wales, bathed by the Gulf Stream, is surprisingly lush. Mining is the main industry—coal and slate. On our way back to Manchester we spent a night at the Red Lion Inn in Shrewsbury with dinner at the White Horse Inn. Built originally as an ale house in 1550, it is now a typical British country pub. How very hospitable the British! We flew from Manchester to Copenhagen. The Royal Palace is impressive, yet unobtrusive, on four sides of a square; the little mermaid at the water's edge was much smaller than expected; the royal yacht was in the harbor and a hydrofoil hurried by us. One day was devoted to a visit to Elsinore and Kronborg Castle

made famous by Shakespeare's Hamlet. The castle is located at the narrowest point between Denmark and Sweden. From 1426 on, ships passing this point had to pay toll to Denmark until 1660 when the Swedes captured the castle and toll collecting ceased. The mark of King Christian IV is everywhere. Oslo was named Christiana when he was monarch. He built lavishly, lived a dissolute life, and bankrupted the country, but the works he left behind are magnificent. He built the castle Frederiksborg in 1602 on three islands in a lake. It has huge brick walls, turrets and a double moat. The highest order of Denmark was awarded to General Eisenhower in 1945, and his coat of arms is mounted on the chapel wall there. On June 7 we left on the famous "Fairyland Tour" through Denmark, so named because of Hans Christian Andersen. Cattle were everywhere. Corn cannot be grown because the nights are too cool. In Silkeborg the museum displays the head of the "Tolland Man" discovered in 1959 and preserved from the 1st or 2nd century in the acid of the bog. It is quite impossible to describe the idyllic Gota Canal trip from Gothenburg to Stockholm. A third of its length is through artificial canals and the rest via lakes and rivers. As many as 65 locks raise the vessels over 300 feet. The three-day cruise came at a welcome time since it afforded us a needed rest. We came into Stockholm at dusk when the golden sky, the silhouetted towers, and the lights of the city reflected in the lake opposite the famous town hall. It made our entry a romantic fantasy. Stockholm is a dream city. Fine restaurants, modern buildings, guard mount at the Royal Palace, narrow streets and fascinating shops—all of these make it a unique city. On June 17 we flew to Visby on the island of Gotland. It has relics that go back 4,000 years and is now known as the City of Ruins and Roses. The powerful Hanseatic League was developed in Visby. Because of its opulence, there were 17 magnificent churches built between 1150 and 1360 as well as the magnificent wall built in 1288 to protect its riches." (We will finish John's saga next month.)

A note from **Albert Murray** begins, "I have not thought of **A. R. Mumford** for the 49 years since we were graduated, but tonight when I saw his name in the *Washington Evening Star*, it was at once familiar." The newspaper clipping he encloses, says, "Albert Russell Mumford, 71, former combustion research engineer in New York, died yesterday at the Prince Georges Hospital after long illness." According to the Percy Nicholls Award, which he received in 1951 from the American Society of Mechanical Engineers, his research on the combustion of bituminous and anthracite coal, on heat transfer, and on the circulation in steam generators "brought about important advances in the utilization of fuels." He was regional vice-president of the Society from 1946 to 1950, a fellow of both it and the American Association for the Advancement of Science. Mumford held many patents on steam boiler operations, including dust-catching devices, drain and washer developments, etc. After

graduation he enlisted in the Navy Reserve and became a junior marine engineer with the U.S. Shipping Board. Soon after advancing to assistant engineer he moved to the U.S. Bureau of Mines in Pittsburgh, Pa., as assistant fuel engineer. In 1923 he became research and design engineer for the New York Steam Corporation where he worked on coal furnace combustion systems until he was appointed associate director of research with Consolidated Edison in New York in 1938. Four years later he joined Combustion Engineering. Mumford is survived by his wife, three daughters, eleven grandchildren, and one great-grandchild. . . . **Gardner E. Johnson** is another member of the class who has reached the far horizon. He died on October 19, presumably in Montclair, N.J., where he lived. No further details have been reported.—**F. Alexander Magoun**, Secretary, Jaffrey, N.H. 03452

'19

We were happy to receive a long letter from **Milt Loucks** of Gloversville, N.Y. He says: "I am trying to retire from my own business, but it is quite difficult to relinquish authority." However, he and his wife Catharine are doing a lot of traveling. Each year they spend a week in April in Bermuda. Then, in 1965, they were in Italy for four weeks covering the entire country from Naples to the Alps, "visiting small villages and meeting the Italian people who prove to be delightful." They later drove 2200 miles through the Scandinavian Peninsula starting from Bergen, through the Fiord country, and ending in Copenhagen. His son graduated from M.I.T. in 1947 and is vice-president of the Oil Mud Division of International Mineral and Chemical Company, and living in Houston. Milt and his wife accompanied him on a business trip to London and Paris recently. . . . Captain **Edward Saunders** called us from Boca Raton where he was staying after a visit to the Keys. He lives in Asheville, N.C. Sorry not to see him. . . . The **Arklay Richardses** of Waban have been staying in Pompano Beach at a hotel which is the tennis center of the Gold Coast, a perfect place for them. Ark is fine and playing tennis every day. . . . Listed below are names of '19ers for whom neither we nor the Alumni Office has any information: Henry Wallerstein, Samuel A. Sherman, John H. Cook, J. Herbert Gould; and the following from China: Chi Y. Huang, Charles F. Yao, Chen-Chi Pan, Gee C. Liu, Ping S. King, Sik K. Lau, Kuangtao T. Lee, Wee K. Lee. If any of you can supply news or addresses, we would be pleased to receive it.—**Eugene R. Smoley**, Secretary, 30 School Lane, Scarsdale, N.Y. 10583

'20

Our Flossie has gone. The grievous loss that our class has thereby sustained was the tragic result of a fire at the Buckland

home, 1711 Randolph Road, Schenectady. **Florence Folger Buckland** was one of the nation's foremost women engineers. She specialized in heat transfer applications at General Electric's Advanced Technologies Laboratories and had been associated with G.E. for 21 years. Upon retirement in 1963 she became a consulting engineer for Mohawk Development Service, Inc. Florence joined G.E. upon graduation, left the company for a time following her marriage, but returned in 1942 to take part in war work. She produced many professional treatises, among them "How to Read Heat Transfer in Russian." Besides her B.S. degree in electro-chemical engineering at M.I.T., she earned a master's degree in electrical engineering at Union College. One of the few women to be honored with full membership in the A.I.E.E., she was also awarded the women's badge of Tau Beta Pi Association, was cited by the Republican Women in Industry and Professions and was a past president of the Schenectady League of Women Voters. She was a fellow of the A.S.M.E. and had served as a member of the Sunnyview Hospital Auxiliary. She is survived by her husband, Bruce O. Buckland, a son and a daughter. A faithful and enthusiastic attendant at class reunions and certainly one of the best-known and beloved members of our class, she will be sorely missed by us all. . . . I am indebted to **Harold Bibber** for the above information about Flossie and her untimely death. Harold had returned to Schenectady after a year in Japan accompanied by Mrs. Bibber. He now resides at 2147 McClellan St. and is rounding out his long and distinguished career at Union as an engineering consultant both at the college and in the Schenectady area. . . . **Creighton Stanwood** recently gave an illustrated talk on "The Art of the Lapidary" at a meeting of the Belmont, Mass., Arts and Crafts Association. An expert gem cutter and maker of handwrought jewelry, Creighton is also a noteworthy collector of New England minerals. He is a member of the American Craftsmen's Council, the Massachusetts Association of Craftsmen and past president of the Lexington Arts and Crafts Association. . . . **John Lucas** is in Rockport, Mass., address 63 Phillips Ave.; **Johnny Rockefeller** is in Elizabeth, N.J., at 110 W. Jersey St.; **Solomon Passell** may be found at 2950 W. Outer Drive, Detroit; **John Crowley** is in Jupiter, Fla. . . . Notice has been received of the death of **George H. Cutter** of West Trenton, N.J. . . . These notes are being written in Corte Madera, Marin County, Calif., a few miles north of the Golden Gate where your Secretary and his Amy generally manage to escape the rigors of New England winter for a few weeks of visiting and babysitting for our daughter's children. We must confess, though, they are no longer babies but now aged 9, 11, and 13, and they grow 'em big out here. We had an exceedingly pleasant visit the other day with Tommy and Janet Thompson, '22, as Tommy is manager of Nash Engineering's San Francisco office.—**Harold Bugbee**, Secretary, 21 Everell Road, Winchester, Mass. 01890

'21

Wish we could now tell you the story of our third interim reunion held outside the borders of these United States. Adherence to the publication schedule requires that the description of this observance of the 50th anniversary of the formation of the Class of '21, held in conjunction with the March Fiesta of the M.I.T. Club of Mexico City, be deferred until next month. So please be patient. If you were unable to attend, how about coming back to Tech for Alumni Day, June 12, 1967, and getting the facts firsthand from some of those who were there? . . . Thank goodness the bad news this month didn't turn out to be any worse! From his new home at 7910 Birnam Wood Dr., McLean, Va. 22101, our Class Photohistorian, **Robert F. Miller**, writes: "Sorry to be so slow in acknowledging your letter. Actually, I have a good excuse since it was just last Thursday evening that I got hit by a car while crossing the street about a mile and a half from my home. I was hospitalized for several days with a severe case of multiple lacerations and bruises. My right eye was a sorry mess, and I thought for a while I might suffer some impairment of vision. I had 30 stitches, eight below the eye and the balance on the scalp. Fortunately, some 30 x-rays revealed there were no breaks anywhere, but I do have soreness in my neck, shoulder and cheek. Everyone has been telling me how lucky I was not to have suffered much more serious injuries. I'll take things easy at home for another week. Helen and I are still planning on going to the reunion in Mexico, however, and will remain in Mexico City through Monday night following the Fiesta. Our daughter Kathleen, who is there, is planning to drive us to Cuernavaca; then we will fly to Acapulco to spend several days before flying back to Washington. The new project of the Post Office Department is going well. The attached press release tells about it. I had the job of organizing it, but its continuing operation will be in the hands of another of our engineers. I will assist, but my work will be essentially in a new area of advanced planning." We phoned the Miller's on receipt of this letter and were reassured by their cheerful voices and Bob's grim joking about having had "a good worm's eye view of a Volkswagen bumper." Our years of urging all '21ers to use seat belts had no bearing in this instance, but we still beg you to use them. The press release to which Bob refers is an announcement of the Post Office Department of the selection of a group of the country's technical and executive leaders to form the Postmaster General's new research and advisory council. Among those initially selected, are Dr. Gordon S. Brown, '31, Dean of Engineering at M.I.T.; Dr. Edward E. David, '47, Executive Director of Communications Systems Research at Bell Laboratories; John P. Eberhard, '59, Director of the Institute of Applied Technology at the National Bureau of Standards; Ezra D. Ehrenkranz, '54, architect with Building Systems Development, Inc.; and Dr. Robert G. Loewy '48, Professor

of Mechanical and Aerospace Sciences, University of Rochester.

Walter W. Anderson reports a move from Brightwaters, N.Y., to his old home town at 620 32nd St., Bellaire, Ohio, 43906. Does this mean retirement, Andy, or are you continuing the practice of architecture there? . . . We hasten to revise last month's premature announcement of the move of Helen and **Ed Farrand** to their home-to-be in La Jolla, Calif. Ed says he will continue to live and to receive mail at Kinchafoonee Lodge, Leesburg, Ga. 31763, for a little while longer. . . . We were "scooped" by the editors of the Review who announced in the February issue the appointment of **Francis O. Holmes** as visiting professor of botany of the University of Illinois. Francis has for some years been a professor on the staff of the Rockefeller Institute, New York City, from which he retired last year. He makes his new home at 207 West Vermont Ave., Urbana, Ill. 61801. . . . **Edward W. Jackson** has left Gardena, Calif., and now receives mail addressed to Box 285, Borrego Springs, Calif. 92004. . . . We assume that **Arthur A. Turner** has retired, in view of a report from the Alumni Register of his new home address at 686 S.W. 4th St., Boca Raton, Fla. 33432. A vice-president, Art had most recently been in London heading the Carborundum Company's operations in England. . . . **William B. McGorum** retired in 1964 as vice-president in charge of engineering for Darling Freight, Inc., of Grand Rapids, Mich. He and Mildred have moved to 109 N. Emory Dr., Sterling, Va. 22170, to be somewhat nearer to son William B., Jr., M.I.T. '50, who is with American Machine and Foundry Company in New York City. Their daughter Patricia lives in Indianapolis. Bill and Mildred have three grandchildren. . . . **Lee J. Purnell** writes that he retired in 1965 and is now emeritus professor of electrical engineering at Howard University. He is continuing as a consultant to the university but now finds more time to indulge in his boating and philatelic hobbies. His memberships include the American Society for Engineering Education, the National Society of Professional Engineers and the Institute of Electrical and Electronic Engineers. He is a former member of the District of Columbia Board of Registered Professional Engineers. Purnee is married and has three married children and two grandsons.

Our Brielle, N.J., neighbor, Col. Edwin E. Aldrin, '17, reports a recent visit to Tulsa, Okla., where he says he had a delightful luncheon with **Bill Sherry** at the Tulsa Club. We agree with Ed in being proud of the cover and inside pictures in color in the February issue of the Review in connection with the story by his astronaut son, Buzz Aldrin, '63, and also the cover and story about Buzz in the January 22 issue of *Parade* magazine. . . . Doris and **Robert W. Haskel** relate that they had a visit last summer at their camp on Cape Cod from Marion and **George Chutter**. Bob says the Chutter's new retirement home in East Dennis is directly across the Cape from his place in Dennisport. Their son Donald Haskel who was graduated from Boston University in 1965, and who is with St. Regis Paper

Company in Newton, is on an extended training program with the National Guard. Their son-in-law, David Crocker, '58, has been with Dr. Draper's Instrumentation Laboratory at M.I.T. since his graduation. David and Roberta have three children. . . . Ethel Burckett (Mrs. Maxwell K.), who lives in Milburn, N.J., has promised a visit to Brielle. She reports both daughters are married and she has three grandchildren. . . . The year-end report which came from Mary Louise and **Rich Clark** says that they went to visit relatives on Cape Cod after last June's class reunion. They experienced a new thrill in riding a "beach buggy" over, around and through the sand dunes near Provincetown. Prior to their reunion trip, they had joined several other retired couples on a trailer trip from their home in Baytown, Texas, through the Davis Mountains to Presidio. Here they parked the trailers and traveled across Mexico from Ojinaga via Chihuahua to Los Mochis on the west coast by means of Mexico's fabulous "railroad in the sky," the Chihuahua El Pacifico Ferrocarril. Rich says: "The scenery through the Sierra Madre range was beautiful and, at 8,000 feet, literally breathtaking." Following the train trip and sightseeing in Mexico, he continues: "We resumed the trailer trip to Big Bend National Park where the cacti were in bloom and we saw numerous species of birds as well as deer, antelope and javelinas." In October they cruised on their Pacemaker, the *Malurich IV*, down the Intracoastal Waterway—away, unfortunately, from its northern terminus at Brielle, N.J. They visited Freeport, Port O'Connor and Rockport, living on the boat and fishing for trout, redfish and flounder. Rich is still active in business management of their church as chairman of the board of trustees and secretary of the finance committee. His Coast Guard Auxiliary work includes chairmanship of the district committee for the Coast Guard Academy. The Rich Clark, Jr., family, with two active grandsons, built a new home last year only twelve miles away on Galveston Bay. Rich has written several letters saying: "Because of the altitude we will not be able to join you in Mexico City. Why don't you stop in Houston on your way down or back?" To the class he has added: "Please stop over in Houston so we can have a small reunion here!" By coincidence we have another letter as we write these notes which says in part: "You probably know that Anne and **Wally Adams** will drive to Baytown to spend a few days with us prior to enplaning for Mexico City. Wish you and Maxine and any others of our classmates would come to Houston. You should see N.A.S.A. and the Astrodome. Hope you all have a wonderful time in the 'land of mañana' and wish we could be with you." We are most appreciative, Mary Louise and Rich, for your kind invitation. We can't make it this time but hope that others in the class who are in the vicinity won't fail to advise **Richmond S. Clark**, P.O. Box 3807, Baytown, Texas. 77520. . . . Through Class Vice-president **Irving D. Jakobson** we learn of the passing of **Weston Hadden**'s wife and express our sorrow

to him for his many friends in the class. Wish we had Weston's returned questionnaire to tell you about the activities of the resident of 22 Monument Ave., Old Bennington, Vt. 05201. . . . If you want to see or have a repeat visit to Mexico's famous Ballet Folklorico, Executive Vice-president **Don Severance**, '38, of the Alumni Association advises that it will be on a tour of the U.S.—in Boston May 9 through 13, New York May 30 through June 11, and in other cities for which information can be obtained from Hurok Attractions, Inc., 730 Fifth Ave. New York, N.Y. 10019.

We approach the next news item with considerable concern and hesitation. Since there has been no response for many years from any of the following list of fellows who were graduated with us, and the Alumni Association does not have good addresses for them, they are presumed to be deceased and have been stricken from the mail list. If you can supply information on any of these men or can suggest a channel through which they can be located, please write to your Secretary at once. Your help will be all the more valuable in view of the forthcoming Class Directory now in preparation in anticipation of our 50th Reunion. Given with the following names are the course and last known area of residence: Oscar A. Anderssen, Course I, last known in Bergen, Norway; Jorge A. Beeche, II, Santiago, Chile; Jorge V. Davila, I, Cambridge, Mass.; Albert E. Golding, China; John J. Hines, XV, Brooklyn, N.Y.; Karl Jetter, I, A.P.O., N.Y.; Reginald W. King, VI, Coral Gables, Fla.; Francisco L. Lazo, I, Mexico D.F.; Kuo C. Li ("Casey"), II, China; Chu Ling, XVI, China; Fred K. Petermann, VI, Laurium, Miss.; Albert H. Ranen, XV, Brookline, Mass.; Emmett J. Scott, Jr., I, New York, N.Y.; Sik See-Too, II, China; Ali Shriro, I, Brooklyn, N.Y.; Alexander A. Skvortzoff, II, Russia; Kuang T. Tu, II, China; Dr. Josef F. Vesely, VII, Czechoslovakia; Chen C. Wang, VI-A, China. . . . Class Vice-president **Irv Jakobson** wears another hat as chairman of our 50-Year Class Gift Committee which is actively carrying on its duties in cooperation with Class Agents **Ed Farrand** and **Ed Dubé**, as you will have noted from their February letter and enclosures. Others serving with Jake are **Sam Lunden**, California; **Dana Kepner**, Colorado; **Dug Jackson**, Maryland; **Ev Wilson**, New Hampshire; **Sumner Hayward**, New Jersey; **Joe Morrell**, Southern New York; **George Gokey**, Upstate New York; **Weston Hadden**, Vermont; **Larry Conant**, District of Columbia; **Art Wake-man**, Wisconsin; **Vivi Valdés**, Mexico. . . . **Eugene S. Clark** is bureau chief, division of sanitary engineering, State Department of Public Health of Illinois, and lives at 2612 West Lake Dr., Springfield, Ill. 62707. He and Mary have three daughters, two of whom are married, and there are six grandchildren. . . . A letter and package of books and pamphlets from Maida and **Ed Dubé** conveyed more helpful data on Mexico; since we were unable to visit them before our trip, they sent their library here! Ed says he is back at work full time and trying to hold down to 8-hour days. He has moved his consulting

engineering office from Room 327 to Room 329 at 120 Tremont St., Boston, Mass. 02108. This grand couple also recorded for us another full reel of tape, with comments, suggestions and other useful and most practical aids for travel in Mexico. Mere words are incapable of expressing our thanks for their great kindness.

With heavy heart we record the passing of three members of the Class of 1921 and extend, on behalf of the entire class, sincerest sympathy to their families. . . .

Arthur Lawrence Jackson of Asheville, N.C., retired director of engineering of the American Enka Corporation, Enka, N.C., died at his winter home in Ft. Lauderdale, Fla., on April 7, 1963. Born in Somerville, Mass., in 1900, he prepared for Technology at Melrose High School. During World War I he served at the Squantum Plant of the Fore River Shipbuilding Corporation and later was an apprentice seaman in the S.N.T.C. at M.I.T. He was graduated with us in Course XIII. He entered the building construction business and went to Asheville in 1929 for the construction of Enka's original rayon plant. On its completion he joined Enka's mechanical engineering department. He also served in the mechanical research organization and became the plant chief engineer in 1949. He was appointed director of engineering for all Enka locations in 1955. During his 33 years of service with Enka he had planned and directed a number of construction and engineering projects including the research center, most of the nylon plant, the rayon staple fiber plant at Lowland, Tenn., and the executive office building at Enka, N.C. We are indebted to Mr. Robert B. Justice, Manager of Personnel Administration of American Enka Corporation, for his kind aid in preparing these notes. . . . **Oscar Buzzell Sias** of 119 Century St., West Medford, Mass. 02155, died on December 3, 1966. Born in Ossipee, N.H., on February 24, 1898, he prepared for the Institute at Exeter Academy. As an undergraduate, Doc was a member of the Civil Engineering Society, the sophomore Electoral Committee and Alpha Tau Omega. He was graduated in Course I and joined the Barrett Company as a chemist where he rose through the organization during 15 years of service to become assistant superintendent of the plant in Everett, Mass. In 1938 he joined the C. H. Sprague and Son Company of Boston as the superintendent of their plant in Portland, Maine, the Cumberland Terminal Company. He then returned to the Boston area as assistant general superintendent of docks for the Sprague organization. He had been with Sprague for 25 years at his retirement in 1963. He was active in the Boy Scouts of America and was memorialized as the chairman of the troop committee of Troop 408 of Medford. He was also active in church work as the past treasurer of the Congregational Church of West Medford and a member of its prudential committee. We wish to thank Mrs. Sias for her assistance in preparing these notes and for her warm letter of appreciation to the class for its message of sympathy. . . . **Frederic Bartlett Dadmun** of 1400 Lake Shore Dr., Chicago, Ill.

60610, died on January 2, 1967. Born in Winter Hill, Mass., he was associated with us in Course XV. During World War I Fred was a private in the S.A.T.C. at the Institute. He had been a traffic engineer for the New England Telephone and Telegraph Company and a buyer with Frederick Loeser Company, Brooklyn, before becoming sales promotion manager of the Cellophane Division of E. I. duPont de Nemours and Company in Chicago. He was active in amateur radio and as a member of the M.I.T. Club of Chicago. He was married and had no children.

Did you return that questionnaire to your Secretary in advance of last year's reunion? If not, please do so now or write for another blank. Your full cooperation is needed to prepare the Class Directory. . . . This will probably be our last opportunity to remind you of the annual class gatherings at luncheon and at dinner on Alumni Day on campus in Cambridge Monday, June 12, 1967. We look forward to your joining the hardy group that comes "Back to Tech" every year for these enjoyable occasions. Hope to see you there!—**Carole A. Clarke**, Secretary, 608 Union Lane, Brielle, N.J. 08730; **Edwin T. Steffian**, Assistant Secretary, c/o Edwin T. Steffian and Associates, Inc., 19 Temple Place, Boston, Mass. 02111

'22 CLASS REUNION June 8, 9, 10, and 11

Hip, Hip, Hooray! These notes are for the month of May. Our 45th Reunion is June 8-11 so we will be getting together real soon. By this time you should have received your reservation blank and have forwarded your check with accompanying form to **Parke Appel** in Dover, Mass. These notes are being written on a sunny, 30-degree Saturday in March while our Buffalo office staff has gone to the slopes 20 miles south for skiing. We have read of the subway accident due to blizzard conditions in Boston and have seen pictures of people on skis and snow shoes on the main streets of Albany and Pittsburgh. It just isn't fair for Buffalo to have very little snow and bare sidewalks and pavements! Your Secretary has just read a letter from President Parke enclosing an itinerary for his March trip to Mexico City, Cuernavaca, Taxco, Acapulco and Dallas. He will have more pictures. His program of the Reunion includes a description of the athletic events, cocktail parties, and elbow bending. Sounds like a busy Thursday, Friday, Saturday and Sunday! All to be followed by our Alumni Day on Monday at the Institute. The attendance list looks like the Blue Book of 1922 aristocracy. Remember June 8 to 11, 1967. . . . To prepare for this major event, our 45th Reunion, your Secretary has re-examined his old musty, dusty files, finding nostalgic reference to the Five-Year Reunion at the Cape Codder near Falmouth. Remember the famous treasure hunt for a large bag of pennies on the beach? **Don Carpenter** was president. Our 10th was at Old Saybrook, and the big 15th at the Seldon House, Pine Orchard, Conn. The pictures of our class on the front slopes in white trousers indicate a

festive youth of the past compared to our "maturity" of the present. The open bar in the garden wing was the most popular gathering place in 1937. Heine Horn ran these affairs. We again went to the Sheldon House in 1942 and to the Hotel Rockmere overlooking Marblehead Bay for our 25th. The Rockmere only accommodated 200, which caused a few to live in near-by motels. **Clate Grover** organized and operated this most successful affair while Al Browning was president. Clate also compiled a most complete business classification index listing our members by states as well as by types of business. Without interrupting our reunion we took buses on Saturday night to the general Alumni dinner at the Hotel Statler in Boston. **Tubby Rogers** was toastmaster, President Karl T. Compton spoke of the future and George Wheelwright showed Polaroid three-dimensional motion pictures. The last Reunion, our 40th, was co-ed—and our wives loved every minute of the three days at the New Ocean House at Swampscott. Remember the swimming pool on the beach, the lovely lounge and dining facilities and the bus trip to Rockport, the artist's studios and the old water wheels at the Saugus Iron Works? The Reunion notes indicate an extremely active tennis foursome, but the greater interest was in golf and grandchildren. At our banquet on Saturday night President Stratton announced the establishment of the Class of 1922 Endowed Professorship as "the single most important contribution made to the Institute by a Reunion Class." It served as an example to other classes of what could be done and as an inspiration to the faculty in supporting new educational advances. This large investment meant a great deal more to M.I.T. than the \$700 000 Class Gift reported at Alumni Day on Monday, June 11, 1962. Do you remember that as an additional event we included a class dinner at the Faculty Club on Sunday night after we had moved down from Swampscott and settled in the dormitories? (The word "settled" reminds us of the worn springs in the beds). The same program is available to us this year minus the large gift announcement.

The most interesting Course IV booklet compiled by **Marion S. Dimmock** has been forwarded to **George Holderness**. Many of its contributors will enjoy seeing it if it can be brought to the June 8 Reunion. . . . We seem to be repeating ourselves in telling of the awards made to **Oscar Horowitz** but his new film, *The Tourist's Russia*, has caused much favorable comment. His film telling of the Pilgrims in Plymouth, Mass., was selected by the Victorian Amateur Cine Society of Melbourne, Australia, as one of the five best films of 1966. Oscar is the only Five-Star Exhibitor in the Photographic Society of America. The maritime news of the Seattle Times pictured **Horace McCurdy** and Gordon Newell with their book entitled *Marine History of the Pacific Northwest, 1896-1965*. We have received notice that **Kenneth R. Sutherland**, founder and partner of Sutherland—Abbott, retired in February. We hope to see Ken at the Reunion. We have also received a note that **Margaret Mall Vignoles** (Mrs.

Arthur) has married William C. Richardson of Newton. We send thanks to **Florence Stiles** for the announcement. . . . Among the new addresses received are those of: Dr. **John W. Strieder**, Newton Lower Falls, Mass. **John B. Wright**, Madison, Conn.; **Ralph C. Geckler**, Nassau, Bahamas; **John W. Kellar**, Duxbury, Mass.; **Margaret C. Kimball**, New York City; **Joshua R. Kingham**, Victoria, B. C., Canada; **Fay S. Lincoln**, Centre Hall, Pa.; **Eugene R. Rowell, Jr.**, Pascagoula, Miss.; **Elmer E. Sanborn**, Atlanta, Ga.; **John B. Starkweather**, Venice East, Fla.; **Charles A. Williams**, Guilford, Conn.; **Donald R. Waugh**, Bridgewater, Conn.; **William B. Elmer**, Boston, Mass.; **Joseph Greenblatt**, Oreland, Pa.; **Thomas H. West**, Nonquitt, Mass.; **Clinton B. F. Brill**, Tallahassee, Fla.; Lt. Gen. **Wilhelm D. Styer**, Coronado, Calif.; **Sydney M. Strauss**, Newton, Conn. . . . The sympathy of the class is extended to the families of: **Joseph C. Patty**, Greenville, Ohio; **Minot R. Edwards**, Houston, Tex.; Capt. **Howell C. Fish**, Coronado, Calif.; **William R. Deeble**, Vineyard Haven, Mass. . . . **Fearing Pratt** has compiled an obituary of our departed classmate, **Frederick N. Dillon, Jr.** of Leominster, Mass. We have been told that Fred's father was in the Class of 1893 which provided the incentive for Fred attending M.I.T. Upon leaving M.I.T. Fred entered the investment business and became the manager of the Worcester office of Spencer Trask Company. Later he was treasurer and president of the D. M. Dillon Boiler Works of Fitchburg, a business founded by his grandfather and the first manufacturer of a steel boiler in the United States. He was also associated with the Brown Bag Filling Company of Fitchburg. After he retired from his business interests, he travelled extensively. A few years ago he married Myrtle Damke of Chicago who provided the comfort of a home which Fred had yearned for so long. He enjoyed sports, particularly outdoor athletics. He played a good game of golf almost until the time of his passing. He fished many fresh waters. He enjoyed his classmates as evidenced by his attendance at many M.I.T. functions and reunions. He was a leader in his fraternity alumni organization. He was a member of the Fay Club, the Oak Hill Country Club of Fitchburg and the Seigniory Club of Montebello, Canada. As a resident of Fitchburg he participated in and supported many of its civic and charitable organizations. Almost unknown to his friends, perhaps because of his intense business image, he had a deep interest in the unfortunate and handicapped people. Even after his passing many organizations will benefit again from his generosity. M.I.T. has been remembered generously. The class of 1922 will provide an appropriate resolution for Fred at our Reunion. We will miss him. . . . We will also miss **Edwin A. Terkelsen** of Newton Highlands who passed away in February. Terk attended many of our Reunions and was always working on a helpful committee. Our sympathy is extended to his family. . . . Our sympathy is also extended to the family of Professor **Eyler Brown** of Eugene, Ore. He received editorial comments for being an outstanding citizen of the

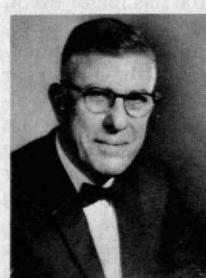
community as well as a member of the University of Oregon faculty, Dean of the School of Architecture, a teacher and counselor of students and a member of Springfield's City Planning Commission "He shared his gifts quietly but without stinting, without expecting any special tribute for so doing." . . . Your Secretary closes on a travel note. His visa and passport are ready for Egypt, Jordan, Israel and Turkey with wife and Chamber of Commerce Trade Mission Group for company. Get in on the facts of the trip at the Wianno Club in June.—**Whitworth Ferguson**, Secretary, 333 Ellicott Street, Buffalo, N.Y. 14203; **Oscar Horovitz**, Assistant Secretary, 33 Island Street, Boston, Mass. 02119

'23

Time for January 6, 1967 (page 59), states that "A Harvard-M.I.T. Joint Center for Urban Studies, created with Ford Foundation funds by former M.I.T. President **Julius Stratton** and former Harvard Dean McGeorge Bundy—who, coincidentally, now hold the two top jobs at the Ford Foundation—advises a metropolitan council embracing 78 towns and cities." The M.I.T. Press announces the availability of "*Science and the Educated Man*"—selected speeches of Julius A. Stratton: an attitude toward learning and a method of thought." Dr. Stratton, Chairman of the Board of Trustees of the Ford Foundation, former President of M.I.T., renowned and beloved educator, speaks from two important personal qualifications: the authority of the practiced expert and the dedication of the natural teacher. You will read his speeches with enthusiasm, recognize the accuracy of his observation, and applaud his attention to the longer view. Dr. Stratton sees education as the means by which we outfit youth to think creatively and productively; education is also the most powerful tool at our disposal to build a better world. With these ideas in mind he discusses some of the most important issues generated by the education boom, the university in relation to government and to the public, academic freedom and personal responsibility, the roles of science and the humanities in education, the engineer as social architect, and others. Dr. Stratton speaks of science as the "lingua franca of modern men" and as the largest single engine of change at work on all our contemporary institutions—social, industrial, academic, and governmental. He would encourage wider study in the humanities among scientists, but suggests too that the humanities have much to learn from the orientation of science to-

ward understanding the world we live in. His real plea is for balance and fullness in the educational program, the production of the educated man, "distinguished by an attitude toward learning and a method of thought rather than by any particular domain of knowledge." Originally prepared for delivery before managers and administrators, students, and educators, scientists and engineers, the speeches take a common theme in their emphasis upon a free exchange of ideas from many quarters. Along with the growing vitality in education, Dr. Stratton foresees a further integration of activities of management, the university, government, and society as a whole. In scanning his various topics Dr. Stratton demonstrates in each case that the university has a vested interest in the vitality of all contemporary institutions. The lasting fascination of this book is the experience of the able man locating the point of most fruitful inquiry and bringing the larger issue to bear upon it. *Science and the Educated Man* is not only a valuable document on the growth and purpose of education; it is also an example of the approach and vocabulary that should be used in discussing all important social questions. Dr. Stratton came to M.I.T. as a student, intending to equip himself for one of many appealing careers outside the academic world. But it was not to turn out that way, and in his words: "over the years, that curious mixture of feelings that most of us have known as undergraduates, that mixture of pride and respect and even occasional anger, grew into a consuming devotion to M.I.T."

Bertrand A. McKittrick writes, "My retirement plans are still progressing. We are liquidating our F & M properties to get into manufacturing and this is it! They make camping tents, hunting clothing, tar-paulins, awnings, etc.; 130 women sewing various colored tents is quite a sight! I like the leisure time (whatever that is!) industry aspect of it." (Secretary's note: the following clipping seems to support Bert's good "retirement" intentions). The Lowell Sun of January 30, 1967, states that "The F & M Real Estate Company of Lowell announced today the purchase of 100 per cent of the outstanding stock of the Hettrick Manufacturing Company, Inc., from the Mount Clemens Corporation of New York City. The announcement was made by Bertrand A. McKittrick, chairman of the board of F & M Real Estate, and A. L. Tombari, president of Hettrick Manufacturing Company. Hettrick will continue to operate as a wholly-owned subsidiary of F & M Realty." New officers and directors are headed by Bertrand A. McKittrick as chairman of the board. The company expects to occupy its added plant at Pink Hill, N.C., early February to supplement production of its Statesville plant. . . . The Newark Evening News of February 10, 1967, states that "Professor Emeritus **William S. LaLonde** of Short Hills will receive the Allan R. Cullimore Award for Distinguished Service, named for Newark College of Engineering's first president. Dr. LaLonde served on the faculty of NCE from 1929 until 1966 when he retired after 20 years as chairman of the department of civil engineering. He



William S.
LaLonde, Jr., '23

earned degrees from M.I.T. and the University of Michigan and worked on a wide array of major civil engineering projects before turning to the field of engineering education. Bill has since joined the firm of Edwards and Kelcey, engineers and consultants of Newark, N.J., as a principal structural engineer, and he says that he is thoroughly enjoying the work and the association. . . . **J. A. Henderson**, senior vice-president of the Guy F. Atkinson Company, 10 W. Orange Ave., South San Francisco, and a nationally known leader in the construction industry, died in Mills Hospital at San Mateo on January 26, 1967. Mr. Henderson lived at 50 Willard Land, Hillsborough. A native of Chicago, he joined the giant Atkinson firm as a vice-president and director in 1958. He was elected senior vice-president in 1965. As an Atkinson executive Mr. Henderson was involved in the management of such projects as the famed Stanford Linear Accelerator Project, completed in 1965, and the \$400 million Mangla Dam Project in West Pakistan, the largest competitively bid, fixed-unit-price construction project in history. Mr. Henderson was active in construction work for 40 years. Prior to his affiliation with Guy F. Atkinson Company he had been president of the United Construction Company, of Winona, Minn., a major construction firm with projects throughout the nation. He was a member of the board of directors of the Associated General Contractors of America from 1948 to 1958. He is survived by his wife Dorothy, a son, two daughters, and ten grandchildren.

John E. Burchard writes: "I have not reported a change of address to the Alumni Office because we still look upon our West Coast residence as temporary and are holding on to our house in Massachusetts. But we will be at 1319 Brewster Court, El Cerrito, Calif. 94530, until June 30, 1968. I am acting dean of the College of Environmental Design (architecture, city and regional planning, landscape architecture and design) at the University of California, Berkeley, and architectural consultant to the Bay Area Rapid Transit District. Each of these jobs is interesting, exciting, even controversial though for rather different reasons. Both the University and BART are sound, whatever their critics may aver and whatever momentary harm may be done to them by misguided politics and reckless yellow journalism. In between I am working on a long book on architecture supported by the Carnegie Corporation. This has led to a good deal of travel to fill out lacunae, most recently to Egypt and Peru, with a final visit to Italy, and especially Sicily, in the late spring. I never thought when I retired at M.I.T. that my life would be busier, and in some respects richer, but in several ways it has turned out to be so. This is helped by the fact that I do return to M.I.T. now and then mostly in connection with the Sloans, and so, like Antaeus, recapture strength from Mother Earth. . . . **Edward McSweeney** writes, "South America is big and of tremendous importance to our future, but it has so many unsolved problems that I don't know where to start discussing them.

The people are leaving the farms in droves; and if it continues, they won't have enough food to feed themselves. Each of the major cities is surrounded by a shantytown which is growing every day. I came away feeling that living in South America must be like sitting on a piece of dynamite, and all we can do is be patient and help. Wish I could be more optimistic, but my feelings are shared by John Gunther in his new book, *Inside South America*, which I read when I got back. If you can get a copy, be sure to read it." . . . Word has been received of the death, with no details available at this time, of **James W. Daniels**, RFD #1, Box 203, Grand Prairie, Texas 75050 on November 3, 1966. . . . The Alumni Office has advised of the following changes of address: **Miss Myrna S. Howe**, 465 So. El Molino Ave., Pasadena, Calif. 91106; **Roger J. Evans**, Public Service Electric and Gas Company, 4140 Quaker Bridge Road, P.O. Box 590, Trenton, N.J. 08604 —**Forrest F. Lange**, Secretary, 1196 Woodbury Ave., Portsmouth, N.H. 03801; **Bertrand A. McKittrick**, Assistant Secretary, 78 Fletcher St., Lowell, Mass. 10852

'24

Never can tell where you may find news for this column. While thumbing through huge stacks of magazines in the basement of a library recently, your Secretary came across an intriguing item in a year-old copy of the N.Y. State Conservation Department's magazine *Conservationist*. Rather, it was the caption under a photo of "Adirondack artist, Sarah Joffe, with her oil painting of wild Canada geese, donated by the artist to the Paint and Palette Festival held recently in Saranac Lake for the benefit of the General Hospital Building Fund." You may remember that Julian Joffe moved up to the Adirondacks some years ago to devote his time to writing, and maybe a bit of fishing and skiing too. Evidently the creative urge is also present in the distaff side of the family. Sarah is "Mrs.", of course. . . . **Harold Hazen**, Dean of M.I.T.'s Graduate School, retires at the end of June. He has had a long and distinguished academic career. Some of his widespread accomplishments will be unfamiliar to you. During World War II he was chief of Division 7 of the National Defense Research Committee, working in the field of ordnance fire control. He did pioneering research on computers, working with Vannevar Bush in the development of the network analyzer. He was chairman of the Commission on Engineering Education which visited Japan in 1951, resulting in the formation of a professional engineering education society there. He is a trustee of the College of Petroleum and Minerals at Dhahran, Saudi Arabia, and of Robert College in Istanbul. You will probably remember that Harold was interim president of Robert in 1961. He has served as adviser to the Engineering School at the American University in Beirut, Lebanon, the University of Iceland at Reykjavik, and the University of Brasilia. Harold has



PHOTO: GSI GRAPEVINE

Cecil H. Green, '23, honorary chairman of Geophysical Service, Inc., received the distinguished Kauffman Medal for 1966 from the Society of Exploration Geophysicists, and shortly afterward he displayed it with appropriate pride for GSI's photographer.

gotten around! . . . Since **Phil Blanchard** is in a family business he's not concerned about the "mandatory 65" bit, but he is beginning to take things a mite easier. He and his brother Carl (M.I.T. '18), have acquired a winter home at the Mountain Lakes Club in Lake Wales, Fla. They, or at least Phil and his wife, spent most of February there, after a warm-up of a few days at Montego Bay. Among other things noteworthy was dinner with Jim and Liz Killian who were vacationing in Florida at the same time. Phil gave us further word on **Scoop** (not Scoops), **Reinhardt**. Seems they were boyhood friends. Scoop was always set on going to West Point, "never having less than 200 lead soldiers when he was a kid." (There ought to be something there about the old Army admonishment to "get the lead out," but it doesn't come to mind at the moment.) Scoop didn't make West Point because of his eyesight, but that evidently was no deterrent in his later Army career. . . . The **Lehrers** are back at it again. This time they're off to the fabled isles of the South Pacific. They started with nine days at the Royal Hawaiian in Honolulu to "rest up" for the arduous trip ahead. After meeting a couple of Narcissus Queens, celebrating the Chinese New Year in a private home (with a staggering feast), and other restful forays, they took off for Samoa. There they lasted out torrential rains and left on a Sunday morning for Tonga, arriving there three hours later on Monday noon. (International dateline, you know.) They have been entertained by various native dancing groups, and the best to date came from the Mormon Mission in Tonga. Could be an eye-catching attraction for Governor Romney's campaign entourage?

The Northeast Corridor has come in for plenty of attention lately. Last December at the annual meeting of the AIAA,

Alexander J. Bone, Associate Professor of Civil Engineering at M.I.T., came up with a backward look in a report titled "Historic Review of Transportation in the Northeast Corridor." Alex took his listeners from Colonial times with its coastal shipping and stagecoach travel, right down to the varied methods in use today, from pipelines to airplanes. Wonder how many left his session with the thought that the good old days of the stagecoach really weren't too bad, after all. . . . Every now and then it seems appropriate to put in a plug for the monthly '24 luncheons in New York. They're held at 12:15 on the Wednesday after the second Monday of each month at the Chemists' Club, 52 E. 41st St. Why not drop by if you're in town on one of these days? If you had done so on March 15 you would have had the pleasure of lunching with **Walter Bagby, Tom Bundy, Paul Cardinal, Ray Forsyth, Sox Kinsey, Dick Lassiter, and Howard Stevens**, a goodly group. Walter and Mrs. Bagby were just back from a couple of weeks in Puerto Rico, where they saw **Luis Ferre** for a few minutes. There was news of **Pret Littlefield**, recovering nicely from his third operation for a detached retina. You would probably have heard about Paul Cardinal's strenuous athletic regimen this winter—indoor tennis, bowling, and walking the dog. Since King is a German shepherd and it's a three-a-day stint, that latter item is not to be taken lightly. . . . Usually the clippings that come our way are self-explanatory, but here's one that literally leaves us up in the air. It's a short item from a magazine with a long name, the *IEEE Transactions on Power Apparatus Systems*, and it concerns **E. C. (Egg) Plant**. After giving essential educational data, and the fact that he has been with Public Service Electric & Gas of N.J. since 1924, it continues: "At present he is forecasts engineer in the . . .," and that's it. What did Egg do? Why the item in the first place, and where did it go from there?—**Henry B. Kane**, Secretary, Lincoln Rd., Lincoln Center, Mass. 01773

'25

It has been a bad month for the Class of 1925 since the notes were put together for the last issue of the Technology Review. There have been four deaths reported during this period. The Alumni Office informed me of the passing of **Theodore M. Kuss** on February 6 in San Francisco. Ted was a victim of cancer. . . . On February 16 your Secretary was shocked to receive a telegram from Irene Lauria saying that **Tony** had died on February 11 of a heart attack while aboard the *Europa*. An article which appeared in the Brockton, Mass., *Enterprise* provided further information that Tony, who was a native of Brockton, had died while on a cruise to the Windward Islands in the South Atlantic. Following graduation from the Institute he had been employed by the Goodyear Company, working in Cuba and later in Brazil, and was formerly manager of Goodyear Service, Inc., in Evansville, Ind., and Bowling Green, Ky.

For a good many years prior to his retirement last June he was an executive in the purchasing department of Sears Roebuck and resided in the Chicago, Ill., area. In addition to being a classmate at the Institute, Tony was also a high school classmate of mine in Brockton. . . . Various Boston papers carried the word that **Charles R. Wexler** died on January 12, 1967, at the Holy Ghost Hospital in Cambridge. He had lived in Chestnut Hill, Mass., for a number of years. His birthplace was in Russia, and he had come to the United States as a young boy, attending Rindge Technical High School in Cambridge before coming to M.I.T. He had been associated with the Raytheon Manufacturing Company in Waltham for a number of years as a senior applications engineer. . . . The Boston *Herald* and *Traveler* carried the news that **Arnold B. Bailey** had died suddenly in Waltham on February 19, 1967. Arnold was a pioneer in the Bell Telephone Laboratory and for a number of years worked at the M.I.T. Lincoln Laboratories and the MITRE Corporation in Bedford, Mass. He was the inventor of the coaxial antenna for ultra-high frequencies and the Bailey antenna. He was the co-inventor of omni-beam method of airplane navigation. He authored a book on antenna systems and held many patents in the fields of antenna systems and navigation. In recognition of his work he was made a fellow of the Institute of Electrical and Electronic Engineers in 1965. He was a member of the Civil Air Patrol in Massachusetts and the Richard C. MacLaurin Lodge of Masons in Cambridge.

On a more pleasant note, a fine letter from **Fred Walker** came in during the past month. Fred notes that since his retirement so many interesting jobs have camped on his doorstep that he is now busier than ever. However, he accepts only those jobs involving things he has always wanted to do, and none that require him to get around earlier than 10 a.m.! in addition to this he is a vestryman and lay reader in his church, and chairman of the Committee on Ethics and Status of the American Institute of Chemists. The following material is quoted from Fred's letter: "My most interesting work is as an editorial assistant for *Choice*, an American Library Association book review journal, where I am in charge of the review of books on science and economics. Our books are reviewed by college and university teachers who are specialists in the various fields involved. I recently wrote an editorial for *Choice* on the history of chemistry, a field in which my interest was first kindled by the late Professor Tenney L. Davis of M.I.T. To my mind, Tenney Davis was one of the greatest teachers I have ever known. It is unfortunate that the history of science receives so little attention in most educational institutions today since it tends to give graduates a feeling that our present knowledge is the last word. This type of dogmatism could easily cripple scientific progress. History of science studies gives one a perspective in which all theories rank as useful but fallible tools. Our 20th century science may look strangely foreign in the 30th century." . . . A final

note concerns **Temple C. Patton** who presented a paper entitled "A New Method for the Viscosity Measurement of Paint in the Settling, Sagging, Leveling and Penetration Shear Rate Range of .001 to 1.0 Reciprocal Seconds Using a Cone/Plate Spring Relaxation Technique" at the 44th Annual Meeting of the Federation of Societies for Paint Technology in Washington, D.C., last November. This paper was published in the *Journal of Paint Technology* and was awarded second prize of \$400.00 in the 1966 Roon Awards Competition. Temple is presently with the Baker Castor Oil Company in Bayonne, N. J.—**F. L. Foster**, Secretary, M.I.T., Room E19-702, Cambridge, Mass. 02139

'26

Last June at reunion **Tony Gabrenas** handed me a manuscript he had written about Class of '26 reunions. Upon reading it, I quickly realized that it would require considerable editing. Tony had been far too literal for publication, so your Secretary has been holding his writings until there was an opportunity to put it in a form that wouldn't embarrass us too much if some other class happened to glance our way. Tony made claim to being the oldest member of our class having reached 70 last June to which **Ed Bromilow** said "Phooey!" However, Ed did not provide us with his vital statistics. Isn't anyone competing for being the youngest member? Let's get back to Tony's manuscript entitled "My Impression of 1926 Class Reunions." Here's what Tony had to say about us: "After graduation in 1926 we plunged into the turbulent sea of life. What is that force that holds us together? It is hard to say. Could it be the common interest in our youthful years spent at Tech and the common problems? Could it be that hard work and discipline which is so valued later in life? Could it be that sincere youthful friendships that we made during four years at M.I.T.? Well, be as it may; but it has lasted for 40 years. In the Year Book of our class by M.I.T. President, Samuel W. Stratton summed up thus, 'As photographs taken during a journey recall not only the scenes fixed by the camera, but the events associated herewith, so the annual not only records the features of classmates and the events of college life, but recall its friendships, its serious work, its pleasures.' Now at our 40th Reunion let us glance at each of the other seven past reunions. The first one was held in 1931 in Plymouth, Mass. I do not recall the name of the hotel; but, most vividly, I do recall the Saturday evening on the beach. There we had a great big bonfire. There by the firelight we sang songs and after singing, we burned the script. The author of the songs was well-known to everybody, but he preferred to be anonymous. The next day, in those far-off prohibition times, we were treated to near-beer. Most of us then were not yet married. There were lots of pretty girls on the beach. The 10th Reunion in 1936 was held in Winchendon, Mass., at Toy-Town Tavern. Yes, we were still young and wild. Some of us roamed along the corridors of

the hotel throughout the night visiting our classmates. We rather strongly celebrated the ending of the prohibition. If our sleepy classmates did not open the door at once, we opened the door and dragged them out of bed. Even **Bud Wilbur**, then either a professor or on the way to becoming one, joined us in this boyish event. To our amazement many classmates rode the wooden horse that was decorating the front lawn of the Toy-Town Tavern, without realizing that it was only a wooden horse. By then, most of us were married. We were so proud of our achievements during the second reunion that some of us took pictures of the event within the frame of the smashed door.

The 15th Reunion in 1941 was held somewhere in Connecticut, near the banks of the Connecticut River at Boxwood Inn. By then we were more mature, and we did not break any hotel room doors. I remember **Bill Latham** toasting everyone in the class. He was even then a big wheel in the government of the city of New York. He was, I think, assistant to Commissioner Moses. We had some sports too. I won a pair of suspenders in a wheelbarrow race. **George Wardner**, faithful attendant of all of our reunions, was hilarious. The 20th Reunion in 1946 was again held in Connecticut in the town of Groton. Of course there was still lots of merry-making, but comparatively it was much more somber than other reunions. There was a reason for it. Not only the United States but the whole world was stunned by the Second World War and still was in shock. Our classmates were more mature and many of them with great responsibilities. **Jim Killian** was already on the upper rung of the ladder of success. I think then he was vice-president of M.I.T. I remember he wore a loud sport shirt which for some reason denied him entrance to the hotel's swimming pool. Someone said, 'I'll bet the guard at the gate did not know that he denied entrance to the swimming pool to the vice-president of M.I.T.' Jim took a picture with the rest of the class. All of us wanted to be as close as possible to Jim. That's how important even then Jim was. Another classmate was on his way to success; it was Professor **Edward S. Hope**. He was on his way to Lebanon to teach at the university in Beirut. The 25th Reunion in 1951 was closer to home grounds of M.I.T. in Osterville, Mass. The weather was delightful. South shore of Cape Cod warmed by the gulf stream was a good place to bathe. It so happened that four of us were assigned to a double room with the twin beds in each. The foursome was Austin Ford (now deceased), myself, George Wardner, and Benny (George's big black shaggy dog). All of us boasted how considerate our wives were who urged us to go to the reunion for a weekend rest. I said the same thing, but it was a lie. My wife objected very much. Benny the dog slept in George's bed and George under the bed. The next day we had a good beach party under the supervision of **Joe Levis**, delicious noon meal, and after many farewells were homeward bound.

The 30th Reunion in 1956 was again on Cape Cod. It was at Coonnamesett, if I spelled that Indian name right. It was a beautiful place. We were quartered in

small cottages, two in each. In each cottage was a fireplace, and we burned birch wood logs since it was chilly at night. This reminded me of East Machias, M.I.T. survey camp. There, every night, there used to blaze a birch wood fire in the recreation hall. There was plenty of good fellowship. There were such celebrities as **General Daws**, the **Kelly** twins, Jim Killian, already president of M.I.T., **Pop Constantine**, and many others. We were more dignified this time. **Dave Shepard** and, I think, **Ray Mancha** entertained the classmates by playing the banjo. George Wardner, with his dog Benny constantly at his heels, was hilarious as usual. The 35th Reunion, that was number seven, was held at Cape Cod also. It was in West Harwich, Mass., Hotel Belmont. The crowd was sedate and solemn, although a few were loquacious. One of the Kelly twins was worried over something or other, but kept up his spirit. Most of us acted our age. Many of them had their wives or other members of the family, but I saw no grandchildren. Joe Levis and his daughter took a golf game very seriously on the putting green of the hotel. Whatever Joe does, he always takes it seriously. **Morris Minsk** walked away with all the prizes in the horseshoe tournament and tennis. Jim Killian with his charming wife also seemed to be pleased—especially Jim, being extricated from the orbits of electrons of some element of an atom with which he was then wrestling in some committee on nuclear power. Jim came back to M.I.T. again, but President Kennedy called him back to Washington to head some committee. So Jim in 1961 was again entangled in the maze of the electronic orbits. Nevertheless, sometimes the simple things give you more trouble than the scientifically complicated. That Sunday afternoon when Jim was departing for home, his slightly aged Oldsmobile would not start. The battery was dead. That is all, fellows. I know that this is only a small fraction of the happenings, and I am sure that many things I overlooked. Some of them might not be too accurate, but at least gives some idea what happened in the last seven reunions. This, the eighth, likely will make history. I would suggest that each one of you write your own impressions of the things that happened in those reunions. Then all of us will compare notes and our Secretary of the Class of '26, George W. Smith, will write a book about our class. Anthony P. Gabrenas, June 10, 1966, Miami, Fla." Your Secretary will welcome any other manuscripts by prospective historians of the Class of '26, but declines firmly the invitation to put them into book form.

We have just received word that **Sidney H. Baylor** died on January 25, 1967—no further information. Some address changes without explanation leave us wondering. **Gordon Spear** has a Pompano Beach, Fla., address, but we do not know whether he has moved or is spending the winter there. The **Bob Richardson**'s have a new address which is 532 Bryn Mawr Avenue, Swarthmore, Penn. 19081. **Sam Brooks** is now living in Falmouth, Mass., and **Frank Cramton** in Ocean City, N.J. A recent news release tells of the election of Jim Killian to membership on the

board of trustees of Washington University in St. Louis. Jim is also chairman of the Carnegie Commission which was established last year to make an overall appraisal of educational TV. In glancing through some of the notes received last June from classmates who could not attend the reunion, **H. W. Geyer** says, "Sorry, I'll have to be in Oregon on that date," and **Bean Lambert** replied, "Many regrets! Several reasons prevent my attending including a son graduating from Yale. Regards to all, Bean." We haven't mentioned Pigeon Cove this month, but as we write on a Sunday evening the ocean seems to be singing a sad song as the rollers pound on the rocks out there. We tried to time it but it is constant with beats of higher intensity. If there were this much noise in the city, it would be annoying; but we are looking forward to having the waves lull us to sleep about an hour from now. We must say cherio until June—**George W. Smith**, Pigeon Cove, Mass.

27

Bob Bonnar's first letter has gone out, and pretty soon we will start hearing which of us will be at the big 40th Reunion. You be one of the ones to treat yourself to this unrepeatable experience! Hope I see you there. . . . Right in the class with winning the Irish sweepstakes comes **Fred Hooven**'s winning a first prize in the *Scientific Americans*' first International Pa-

PLAN AHEAD for your CLASS REUNION!!

Mark these dates down

on your calendar

June 9 10 11

AND

Alumni Day June 12

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- Relax and enjoy a wonderful week-end
- Then come back to the campus and witness the many changes, see, meet and talk with the faculty and listen to the dynamic seminars on Alumni Day

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Andy Andrews, '27

per-Airplane Competition. There were 10,941 entries. Fred's "flying wing" stayed aloft for 10.2 seconds and took the duration prize. *Time* magazine of March 3 published a working drawing of his 9-fold model. *Time* says that Fred is an engineering consultant at Ford in Detroit. He was formerly director of Ford's research planning office. . . . After nearly 40 years of service, **Andy Andrews** has retired from Eastman Kodak. He was manager of building services. He started with Eastman as a chemist, then went into film processing equipment installation. During the war he became a Lt. colonel (though most of his work was Navy aeronautical photography). . . . In 1954 **Louis Brega** left his position as superintendent of buildings and grounds at Rhode Island Hospital and was appointed general manager of Vassar College, responsible for operations, services and construction. He will retire next January. . . . The classnotes of May 1952 were much longer than these. **Walter Johnson** had just moved to Baltimore with the "newly-established" Air Research & Development Command. **Charlie Smith** had just joined General Electric in Louisville. **Hank Kurt** had been with Grumman 10 years, was flying actively, "even jets." It was **Fritz Glantzberg** Day to honor the general as he left Savannah, Ga., and Hunter Air Force Base to take up a new command at Kirkland A.F.B. **Jim Chirurg**'s advertising outfit had completed the biggest year in their history. All this and more, just 15 years ago. There were all heading for the reunion too. How about you? . . . Next month there may not be any classnotes as I hope to be on vacation from my real estate activities.—**Joseph S. Harris**, Secretary, Masons Island, Mystic, Conn. 06355

'28

On March 14 an important segment of the 40th Reunion Committee met for luncheon at the Faculty Club in Cambridge. Present were **Jim Donovan**, Florence Jope, **Charlie Worthen**, **Walter Smith**, and chairman **Abe Woolf**. Your Secretary was unable to attend because of a prior engagement and is obligated to Abe Woolf for submitting to us a summary of the substance of the meeting. All possible candidates for chairman of the various committees were reviewed, and it was decided that an over-all group chairman from the general reunion committees should be assigned to handle the work committees, and the work committee chairmen should supervise the 14 activities which should cover the complete reunion. Exactly what this para-

graph means we don't know; we're only quoting from Abe's letter. We do know that general assignments of the various alumni were made to these committees, and it was resolved that the assignments would be checked for their acceptance. The general announcements to all members of the class will be made sometime in September. It was also resolved that a meeting should be held as the 39th Reunion on June 11, 1967, which is the Sunday before Alumni Day. This meeting should be a Sunday dinner meeting from about 3:00 P.M. to 7:00 P.M. to be held at McCormick Hall or a downtown hotel or motel or even at Florence Jope's home as a catered affair. Principal purpose of this meeting would be to foster the spirit of our 40th Reunion and to bring together for the first time members of various committees in a preliminary organizational effort. This will also be a good opportunity for some of us to get mildly drunk and for everybody to have a good time before Alumni Day. After other details were discussed and agreed upon, such as time of the next meeting and a special letter to be sent out by Florence Jope to wives of classmates, the meeting was adjourned at 2:30 P.M. To all of you we again flash the message, "We have a date for '68."

From various sources we have learned of the following: **J. Armand Monier, Jr.**, was early this year promoted to plant manager of the Savannah River Plant of the DuPont Company. Armand earned his B.S., M.S. and Ph.D. in organic chemistry at the Institute. He also studied at the College De France in Paris. He joined DuPont in 1933 and entered atomic energy work in 1951 when he went to the Dana heavy water plant at Terre Haute, Ind., as technical superintendent. He makes his home in Augusta, Ga. . . . From various newspaper clippings we learned that **Alfred C. Knight**, Cotuit, Mass., Course IX-A, was recently named judge of the Barnstable probate court. Al studied law at Boston College after graduation from M.I.T. and was a lieutenant colonel in the army in World War II. He received the Bronze Star in the Battle of the Bulge. He has been register of probate in Barnstable since 1953.

. . . We notice in a newspaper story that **Willis Tibbets** furnished the color photography which illustrated a lecture by his wife before the Watertown, Mass., Garden Club in January. Willis had the honor of having some of his pictures on exhibition for two years at the World's Fair in New York. Mrs. Tibbets, world traveler, lectured on "Garden Delights of Europe." . . . And from a news release we learned that **Al Dempewolff** was recently named publisher of *Motor* magazine of the Hearst magazine division. Al joined the Hearst organization in 1960 as director of marketing and sales promotion for *Good Housekeeping*. Prior to that he was an independent marketing consultant to clients throughout the country. From 1940 to 1958 Al served the Celanese Corporation of America where he held executive and market development responsibilities for the textile division. He served as an army officer in World War II in the European theatre and is a past

director of the Association of National Advertisers. . . . You fine gentlemen who live in apartments in New York City and other large metropolitan areas should be interested in a letter that the wife of classmate **Ernie Knight**, Louise, sent to Florence Jope last Christmas. We quote excerpts: "This past fall we changed from summer occupancy of our cottage on Panther Pond in Raymond to something closer to year-round occupancy. Ernest is teaching a variety of science courses at Casco High School, 10 miles from home, instead of teaching and living at Gould Academy, and finds a better balanced way of life. Louise is again 'at the stove' and fully enjoying the fireplace and keeping house again. She has taken up hand-weaving, and someday Ernest hopes to get back to it also. Weaving is not a rocking chair activity. That stage may come soon but it is not here yet. The cottage is winterized and with furnace heat, but we take our water from the lake, and the road in to our cottage is 1 1/4 miles from a highway so winter brings problems concerning water and plowing. We can make it until after the holidays when we will be using the home of friends here in Raymond who are away for the winter. Spring and mud-time will be right around the corner though, and we will soon be returning to our hideaway in the woods. Paul is in his second year at Northeastern University in Boston, in the School of Business Administration. His summer vacation days are over as N.U. is cooperative with two quarters a year in school and two quarters working. He and two others have an apartment, he is rowing on the Northeastern crew, and all phases of his school life are going very well. David and his wife Carol are still in Philadelphia, David at the University of Pennsylvania School of Veterinary Medicine, where in June he will be finishing his work on a research fellowship in cardiology, and Carol teaching in public school. They have a 1684 home in Springfield, a suburb of Philadelphia, which he is gradually making younger in condition while getting older in years. David is still rowing although he perhaps is through with competition, at least that beyond recreation and inter-club activities."

From the U. S. Department of Health, Education and Welfare we learned that **Dr. Roland F. Beers, Jr.**, associate professor of radiological sciences at John Hopkins University, was awarded a grant of \$312,878 to study the affects of radiation on human beings. The program will be carried out at the School of Hygiene and Public Health at Johns Hopkins. Dr. Beers, a graduate of Dartmouth College, earned his M.D. degree in 1947 and a Ph.D. in biochemistry from M.I.T. in 1951. He was on the M.I.T. staff until 1966 when he became director of research at the Johnson Research Laboratory, Children's Hospital, Baltimore. . . . We are very much indebted to Jim Donovan for submitting many notes, letters and other material. We have edited the following: A letter from **Bob Harris** states: "It was very thoughtful of you to write and invite me to attend the Alumni Council meeting on January 30, and I wish that I could have been present. The

only meeting I have attended during these many years was the one at which I was invited to give a talk regarding our research results. The past six weeks have been unusually complicated by annual reports, preparation of manuscripts and NIH application, etc. I had hoped until the last hour that I could find a way to be free, but failed you. Sorry. It was too bad also that I had to be in Washington during the period when **Bill Carlisle** died. He was one of my favorite classmates. **Jack Chamberlain** had predicted Bill's fate some months ago, and it was difficult to see Bill from time to time knowing his days were limited. I understand that he knew his days were numbered, yet he lived bravely to the end. Ralph and Bill represented the finest in our class. They have gone, and it will never be the same. . . . Through Ken Brock I learned that the Class of '27 is putting on a serious campaign to convert cash value of that dear old class insurance into cash and add this to their 40th Reunion Gift. Jim asks the '28ers do likewise, because boy, oh, boy, we sure need all the help we can get to build up our 40th Class Gift. . . . We repeat verbatim the words on an engraved announcement: "Mr. **Charles Edward Richheimer** has the honour of announcing the marriage of his daughter, Adele Rose, to Lieutenant Commander Thomas William Harwell, United States Navy, on Saturday, the fourth of March, nineteen hundred and sixty-seven, The Cathedral of Saint Philip, Atlanta, Georgia." . . . A letter from **Dave Haynes**, Point O'Rocks Vacation Apts., 1001 Point of Rocks, Sarasota, Fla. 33581: "Dear Jim, I'm down here suffering from the 75 to 80 degree temperature while you are enjoying winter weather there. However, before I left I did get in touch with **Myron Helme** and **Carleton Grace**. Both are planning to give but they asked that I get in touch with them later; Helme suggested in April and Grace in June. I'll call them both when I get back in April. I called **Alfred Francis** several times but could never find him in. I'll call him also when I get back. I spend from April to November in York Beach, Maine, so if there is anything I can do in that area, please let me know."

From **Mid Chism**, 1200 96th Ave. S.E., Bellevue, Wash. 98004: "Dear Jim, you have been persistent over the years for and in behalf of the Class of 1928 and are to be commended for your devotion to the Institute. Since I was at Tech for only two years, I do not feel too much like an alumnus, since the first two years appear to be the hardest. My first year was a dilly—freshman, sophomore and junior courses all at once. But I survived; and the senior year was a breeze. I do not know another '28 man in the area here, and will be of little, if any, help to you; but I will promise to do better next year for our anniversary in so far as contributions are concerned. Incidentally, we were smart cookies to come out to Seattle on our honeymoon following graduation. We have been everywhere and finally returned here to make our home, and have not regretted it once. It is dampish in the winter months but mild, rarely snow or

hard frost, and the summers are heavenly divine, never hot. We were fortunate for one daughter who revolted and gave us eight adorable grandchildren. Hope all continues well with you and yours, and the Institute. Maybe we will take off some time and come back to see for ourselves—stopped by in '50 at twilight but saw little. Maybe '68. Our kindest." . . . And a few incidentals from the **Donovans**: "Late one Friday had a very few minutes in Pittsburgh before catching an airplane, saw **Bill Archibald**. He and Clara have three sons, one is in the Graduate School at Columbia, one is in the Navy on an aircraft carrier in the Pacific, and one is at the Brooks School. Bill's firm is building the newest steel mill in America, out in cornfields in the great state of Illinois. He looked well and is enjoying the challenge and opportunity." . . . I had a postcard from **Ted Hartshorne** who is traveling in Mexico and says he hopes to see **Walter Nock**. . . . I had a pleasant Christmas card from Trudy and **Don Francis**. All the children and grandchildren were down. They slept some in their cabin cruiser, some in motels around about, and had a 25 lb. turkey for dinner. . . . I had a nice note from **Art Josephs**: "Good to hear from you. Sorry I missed you when I was in Boston a year or two ago. Time goes so fast that it's difficult to keep track of the years between visits. I did have a nice visit with Ralph and his family, you were out of town, and Ralph was most helpful and cordial to us as always. I hope you will come to Duluth; it is really quite unique and especially attractive in summer. Even the winters have become more active for the adults who seem to have been badly bitten by the snow mobile bug. They are all over the place. See Palo and Ann each year, my friends from Duluth who go to Spain and are royally entertained by **Hector Hagedorn**. Do hope you will visit Duluth; bring the family. Will do my best for the 40th."—**Hermon S. Swartz**, Construction Publishing Company, Inc., 27 Muzzey St., Lexington, Mass. 02173

'29

Your Class Secretary will be in Mexico enjoying the M.I.T. Fiesta and other attractions of Mexico when the class news for May is due, so ask to be excused from a news report this month. However, would like to share a very nice card from **Wally Gale** dated February 17, 1967, and postmarked Tanzania, Uganda, Kenya, East Africa, on which he writes, "Just to report in after two weeks in the wilds of Tanzania and Kenya. Drove over 1600 miles in a land rover following game trails. Counted 77 lions, over 200 elephants, and lost count of buffalo, impala, etc. Daughter Joan flew over to meet us in Rome and will return home next Monday. Mama Joan and I hop a ship in Mombasa for Capetown and other African ports. Will be home after May 1 and look forward to seeing you and Olive on Alumni Day, if not sooner." Thanks for the card, Wally, and we'll be looking forward to seeing you on Alumni Day, too.

Best regards.—**John P. Rich**, Secretary, P. O. Box 503, Nashua, N. H. 03060

'30

It is gratifying to be able to report that there has been a vernal burgeoning of material for the notes this month. Of the returns that came in, the most comprehensive by a wide margin is that received from our former Class President **Joe Harrington**. As many of you know, Joe is a senior staff member of Arthur D. Little, Inc. His work involves consulting engineering, principally mechanical, as well as management advice. In recent years he has specialized in numerically controlled machine tools, on which subject he does a good deal of consulting, gives seminars and individualized advice, and is currently writing a book. All of the Harringtons' children are now married. Older daughter Joan graduated from Smith College in '58 and is married to Dr. Roger G. Smith, an M.D. specializing in internal medicine. The Smiths live in Portland, Ore., and have two daughters. The Harringtons' younger daughter Anne graduated from Wellesley in '64 and is a candidate for a doctoral degree in musicology at N.Y.U. She is married to Dr. John Heider who received his doctorate in clinical psychology from Duke University. The Harringtons' son, Joe 3rd, graduated from M.I.T. in '61 and received his Sc.D. in nuclear engineering in '66. He is working at the Austrian Nuclear Reactor Center at Seibersdorf and living in Vienna. In 1963 he married Diethild Muller who is studying for a doctorate in history at the University of Vienna. Perhaps the outstanding bit of news in Joe's communication was the information that Joe 3d and Diethild have recently produced Joseph Harrington 4th. Needless to say Joe and Alene will be traveling to Austria very soon to see the new grandson. During the course of this trip Joe plans to stop in London and give several seminars on machine tool control. Joe and Alene are both active in civic affairs in their home town of Wrenham. Joe has been town moderator for the last eight years and has held various offices relating to health, planning and finance. Alene is president of the Historical Society and Museum and a member of the Library Board. Joe reports that he has recently adopted the practice of telephoning classmates from the airport or hotel during the course of his travels and urging attendance at the 40th Reunion. You may receive a call from him one of these days. . . . **John Hanley** is vice-president of Northern Natural Gas Company in Omaha. His son John is majoring in geology at Iowa State University. . . . **Henry (Hank) Halberg** is a hydraulic engineer with the U. S. Geological Survey in Little Rock. His work involves water resources investigation, especially ground-water investigation. His hobby is bird watching; he is president of the Puleski County Audubon Society. . . . **Charles (Chuck) Habley** is manager of market planning and research at the missiles division of Lockheed in Sunnyvale, Calif. The Hableys have four

children: daughter Ann who graduated from Ohio Wesleyan, daughter Gail who graduated from the University of Georgia, son Peter who is studying for an M.A. at the University of the Pacific and son Stuart who is an undergraduate at Oregon State. Chuck reports that he is planning to go into the Peace Corps in two years. . . . **Frank Hankins** retired last December as technical services manager of Lockheed Air Service Company in Franklin Lakes, N. J. He is spending the winter "looking after or rather helping wife to run a deluxe apartment complex for a friend, Sarasota. We will probably live through it!" The Hankins have three children: Anne who graduated from Skidmore in '67, Timothy who received a B.A. from Dartmouth in '62 and is now studying for a Ph.D. in radio physics at the University of Calif., Frank who is Dartmouth '65 B.A. and now a Lt.(jg) USN (aviator). . . . I am sorry to say that I missed the M.I.T. get-together held in connection with the TAPPI meeting in February. It was scheduled as a breakfast at 8 A.M. which is a somewhat awkward time for us commuters. However **Howie Gardner**, who came East for the meeting, stopped in to see me and we had a pleasant chat. As many of you know, Howie has moved from the Institute of Paper Chemistry to the University of Washington in Seattle where he and Teddy have a house which, according to the picture he showed me, must have a spectacular view. One by-product of the move is that the Gardners are able to see their daughters more frequently. The older daughter Ellie is teaching American government at Sonoma Junior College and younger daughter Carol is assistant editor of a house magazine at the University of California in Berkeley.—**Gordon K. Lister**, Secretary, 530 Fifth Avenue, New York, N. Y. 10036

'31

It was a great shock to learn of **Maddie Cannon's** death on January 23 of this year. Maddie had been chief engineer for Bird Machine Company, South Walpole, Mass., for 17 years, during which time the company quadrupled in size. After graduating from Tech he taught machine design at the Institute for three years. Prior to joining Bird he worked as a designer, project engineer and in research and development. At Bird he developed a number of patent inventions applying to screening and cleaning equipment used in the pulp and paper industry. Our deepest sympathy goes to Ronnie and his children. . . . A recent news release from the U. S. Atomic Energy Commission tells that **Larry Mohr** has been named area manager for the proposed 200 billion electron volt (BEV) proton accelerator project at Weston, Ill. Larry joined the Atomic Energy Commission in 1947 as an engineer at the Los Alamos office in New Mexico and transferred to Washington in 1950 as chief of the construction branch in the division of construction. In 1958 he became director of the

division. As manager of the Palo Alto area office, Larry has been responsible for the administration of the prime contract with Stanford University for construction and operation of the Stanford linear accelerator. . . . Word has also been received of the death of **Vladimir A. Semion** on February 12, 1967. . . . A clipping recently forwarded by the Alumni Office contains an article by **Fred Jelen** which appeared in the November issue of *Materials Protection* entitled: "A Prediction for Protective Coatings." . . . News has also been received that **Bob Fleming** is now at INTERMA, P.O. Box 59-2056, Miami, Fla. 33159.—**Edwin S. Worden**, Secretary, 35 Minute Man Hill, Westport, Conn.

'32

The 35th Reunion will be held June 9, 10, and 11, 1967, at the New Ocean House, Swampscott, Mass., just north of Boston. As of March 15 we have had responses from the classmates and wives listed below. We are publishing the list with addresses in case you would like to make contact with friends from your area before leaving. We hope that if you haven't made up your mind yet, you will see names of some old friends you would like to see again and will join the party. When you read this early in May you will still have time to let your Chairman and Secretary know that you want to receive the hotel reservation forms which must be returned direct to the hotel before May 26. From the *West, Central, and South*: Russell and Mrs. Robinson, 124 Via Yella, Newport Beach, Calif.; John and Jan Lawrence, 5527 Meadow Lane, Dallas, Tex.; Robert and Mrs. Phemister, 458 Parkwoods Avenue, Kirkwood, Mo.; Willis S. Hutchinson, 2161 Commonwealth Avenue, St. Paul, Minn.; Robert and Mrs. Semple, Wyandotte Chemicals, Wyandotte, Mich.; Henry and Edith Mitchell, 1207 S. Park Lane Drive, Freeport, Ill.; Robert J. Dunlavy, 336 S. Rose St., Palatine, Ill.; Arch and Mrs. MacKusick, 745 Carambola Drive, Merritt Island, Fla.; George and Mildred Falk, 3475 So. County Road, Palm Beach, Fla.; James and Mrs. Harper, 2700 So. Grant St., Arlington, Va.; John and Mrs. Robertson, 6505 Lakeview Drive, Falls Church, Va.; James and Bernice MacDonnell, 908 Camden Avenue, Salisbury, Md.; Latimer and Mary Glowa, Owen Brown Road, Elliott City, Md. From *Ohio*: Harry and Mrs. Johnson, 2817 Wellsford Road, Columbus; Wendell and Mrs. Bearce, Box 241, St. Clairsville. From *Pennsylvania*: Frank and Mrs. Chaplin, Johnson Road RD 4, Norristown; Eugene B. McBride, 404 Davisville Road, Warminster; Joseph and Mrs. Stowell, 501 Howard Avenue, Altoona; Addison and Marion Ellis, 15 W. Bells Mill Road, Philadelphia; Charles and Elizabeth Thayer, 402 Ridge Avenue, Kennett Square. From *New Jersey*: Raymond and Mrs. Schaefer, 104 Chestnut Ridge Road, Saddle River; Sidney and Mrs. Edelstein, 338 Hillcrest Road, Englewood; Chip and Alice Chase, 1710

(4)

Watching Avenue, Plainfield. From *New York*: Winston and Marjorie Braxton, 208 Sherwood Drive, Dewitt; Stanley and Mrs. Johnson, 134 Sun Haven Drive, New Rochelle; Edmund and Mrs. McLaughlin, Croton Lake Road, Mt. Kisco. Harry L. Moore (Pheasant Lane, Greenwich, Conn., or Mobil Oil Corp., 633 Third Avenue, N.Y.C., N.Y., Tel: OX-7-4200, Ext. 2122) is organizing a contingent from the New York City area. From *Connecticut*: Frederick and Suzanne Green, Cedar Hills, Weston; John and Mrs. Kelton, 6 Nutmeg Lane, Westport; John Osterman, Hamilton Lane, Darien; Willis and Mrs. Moore, 15 Anderson Road, Greenwich; Harry L. Moore, Pheasant Lane, Greenwich. From *Rhode Island*: William and Mrs. Barker, 18 Creston Way, Warwick; Albert and Mrs. Stewart, 223 Howland Road, Adamsville. From *Massachusetts*: Richard and Debby Berry, 310 Farm Lane, Westwood; Donald and Doris Gilman, Drawer G, Warren; Robert and Louise Prescott, 2 Forest St., Lexington; John J. Brown, 58 Chandler St., W. Somerville; Herman and Ethel Protze, 41 Martin Road, Wellesley; Melvin and Mrs. Castleman, 163 Beach Bluff Avenue, Swampscott; Thomas and Jean Sears, Jr., 31 St. James St., Boston; Donald and Betty Whiston, Box 10 Wapping Road, Kingston; Donald and Phyllis Brookfield, 168 Massapoag Avenue, Sharon; William and Marjory Pearce, 21 Chestnut St., Sharon; Walter and Martha Nickols, 30 Cushing Avenue, Hingham; Arthur and Rebecca Marshall, 135 State St., Springfield; Albert and Helen O'Neill, 476 Pleasant St., Milton; Frederick and Irma Mader, 15 Parkview Lane, Shrewsbury; Thomas and Rose Weston, P. O. Box 1, Middleboro; Benjamin and Marion Chadwick, 86 Washington St., Marblehead; G. Edward and Eleanor Nealand, 63 Lawton Road, Needham; Robert and Kathleen Minot, 8 Newbury St., Boston; Julius Brody, 32 Franklin Hill Avenue, Dorchester. At the rate this list is growing we expect it to double, so we will have a good crowd and a good time. Hoping to see you in June.—**Elwood W. Schafer**, Reunion Chairman and Class Secretary, Room 13-2145, M.I.T., Cambridge, Mass. 02139, Tel: UNiversity 4-6900, Ext. 6841

'33

As you folks read this epic, it is spring, and about time. We have a couple of names this time that seldom, if ever, appear in this column. **Emerson Norris** of Great Neck, N.Y., comes through for the very first time. He was greatly impressed with our condensation of **Bill Moore's** recent Chicago speech which, I think, was the real cause of his writing. Emerson has three daughters, all of whom have finished college, one each at Swarthmore, Mount Holyoke, and Wilson. His only son is at New England College in his first year. Two of the three girls are married, and one of these two before marriage spent two years working at M.I.T. in the psychology lab. It appears that Emerson and his wife are to become grandparents in

May. Now you can spoil a child and feel no guilt. The Norrises have a summer home on a mountaintop in East Hiram, Maine, only 50 miles from Exeter. They love it and expect to love Fort Rock when they get around to slowing down in New Hampshire. Emerson is now "going it alone" with the new Channing Company, Inc., though he spent 16 years with Sylvania first in metallurgy and then in administration. Channing Company is in the investment and financial planning field.

. . . **Clarence Farr** of ham radio fame, Station W1WMK, Reed's Ferry, N.H., writes us from Honolulu. Clare and his wife are visiting son Dick and family, and only incidentally are escaping from the usual February weather in New Hampshire. Clare wants full credit for turning up information on **Frank Der Yuen**; both of these fellows were Course XVI men long ago. Frank is working at it as secretary and vice-president of Aloha Airlines. Clare sends a clipping from the Honolulu *Advertiser* containing an account of a Governor's Committee on Food Prices at which Frank made this offering as testimony, ". . . within a few years 223 foot jets will be shipping food to Hawaii at the same rate now charged by Cargo Ships at \$7.50 per hundred pounds." Frank made extensive studies of freight transportation by air while at Lockheed. The new jets will be able to load the 8' x 8' container bins now used by the Matson Lines through the nose of the planes. . . . **Dick Morse** now comes through again, this time being elected to the board of trustees of Research Analysis Corporation of McLean, Va., adding still further to his long and distinguished career in the allied fields of technical management in research and development. To continue I must quote: "RAC is an independent non-profit organization that applies operations research and systems analysis to the study of global military, political, and economic problems for the Army, organizations in the defense establishment, and civilian federal agencies. . . . A short one from **Jim Vicary** tells me that he teaches one course at the Erie Penn State setup. . . . A note from **Henry Kiley** tells us that he and Betty can be counted on definitely for the 35th Reunion in June 1968. . . . I have a letter from **Louis Alpert** in reply to an inquiry of mine. He has been back in Chicago since 1959, and since 1933 has worked for the same company in Perth Amboy, San Francisco, Los Angeles, West Orange, N.J., and now again in Chicago. This all with G.M. of Midwest, Division A.S. of R. With three children the Alpers are grandparents since December, '66, their granddaughter being the first of their elder daughter Muna who is a graduate of the University of Michigan. The younger daughter, middle child, is to graduate from the University of Illinois next June and will be married soon thereafter. Their youngest, son Edmund 14, is a freshman at the University of Chicago Laboratory School. Louis is an ardent golfer and is an 8mm movie enthusiast. He has visited most of the U.S. and has visited Europe once. Like many of us, travel comes naturally. Louis is sorry that his daughter's wedding will prevent them from attending the 35th Re-

union, especially as they enjoyed the 25th so much at Cambridge.

Now comes a short one from **Ferd Johnson** in reply to a short one of mine. Family is fine following the move to Delmar, (near Albany) last summer on a brand new job mentioned in November notes. The Johnsons have their two children in college at the same time; a daughter is a freshman at Wellesley, and a son is a sophomore at Northeastern. He has seen no classmates, in spite of the fact that since August he has gone on business to Mexico and South Carolina. Men, when you feel a business trip coming on, drop me a line or phone me collect for the addresses of classmates in the immediate section where your trip will take you. Our address list is 99% up to date, thanks to an alert Alumni Register, and these men like to receive phone calls even though they do not know the caller personally. . . . **George Stoll** finds it quite appropriate to be selected as Chairman of the 35th Finance Committee and apparently welcomes this added heavy work schedule. He will surely spend at least an hour on it before Alumni Day, 1968. George is another who travels around, but doesn't realize that there are classmates all over just longing for a phone call from the affable Georgie. . . . **Dick Warner** writes briefly saying that he will serve on the 35th Committee gladly, and this ought to be great inasmuch as he lives right on top of Chatham Bars Inn at Falmouth. He says that he is a grandfather now for the fourth time, having been in New Jersey for the last blessed event in January. The grandchildren are three, two, one and one month. Three of the Warners' four children are married, and the fourth, a recent returnee from the Peace Corps, will soon marry in Falmouth. At present she is working on her masters at Penn. State, comparative education. The Warners are again in business renting rooms and are doing some amateur gardening, and more renting by purchasing a house for rental purposes. . . . **Mal Mayer** is on the hop again, this time right back over the same circuit as one other time —New Zealand, Australia, Nairobi, Mozambique, Johannesburg, Angola, Lisbon, and Madrid. Mal is an experienced traveler and he wrote me early for a list of classmates along that route, and he got it. I even added "**Musty**" **Mostafa**, Cairo, just in case Mal stopped by to sell good will for the beer trade. It is nine years since any of us, except the Institute itself, have seen Musty. I understand that he was in attendance when his son graduated a few years back. Mal was in Puerto Rico and talked with **Bill Pleasants**, but somehow they both failed to carry through. The letter was written from Carmel Valley, Calif., where the Mayers are visiting Mrs. Mayer's mother. . . . Above we mentioned having complained to Jim Vicary about being a man of too few words, so he fixes that. He is still chief executive officer of his Ervite Corporation, and son Charles is vice-president and administrator. Ervite is engaged in the enameling of metals. Jim has been active in the Porcelain Enamel Institute and is now treasurer, having held all other offices previously. The Vicaries were married in 1934

and besides son Charles have daughter Carolyn, married and living in Hartford, and another son who is an engineer with the Eri City Iron Works. Jim keeps his hand in golf, bowling, and bridge, and is a Do It Yourselfer. He is president of Hamot Hospital, National Director of ACES, (Americans for the Competitive Enterprise System). He is a member of the Pittsburg Theological Seminary Board, the Marine National Bank Board, and is on our own M.I.T. Educational Council. Further, he is on the board of the Erie Advertisers, Liberty Mutual Insurance Company, and the Blue Cross of Western Pennsylvania. Mr. and Mrs. Vicary took a flying trip last year to Australia, New Zealand, Tahiti, and Fiji, and another last spring, six weeks all over the Orient.

We are again pleased to hear briefly from **Frank Heselton** who is one of our more faithful correspondents. Frank is to speak at a National School Board Association Convention in Portland, Ore., come this April. Any Course IV-A boys in the area please take note. Frank will talk on "Predicting Financial Needs." He has recently been honored by being elected a Minuteman, which is a Merit Badge awarded to those chosen as having reflected considerable credit upon Michigan all over the U.S.A. . . . A note from **Bill Harper** tells us that he went recently to Minneapolis to speak at a convention of his professional group. It is quite evident that any summer gatherings of that group will be held in Yuma. It appears that Bill is right now busy trying to locate **Cal Mohr** who, as I write, is supposed to be attending a winter meeting of the Chemical Engineers in Houston. However, I have had no report as yet. You will recall that Cal had a long list of classmates to visit with and report on. . . . We flew to Scotland early in February to attend the Perth Cattle Show and Sale (Angus) and also spent a few days in London, but had to forego our intended visit to Madrid and San Juan. Though England and Scotland are supposed to be just plain cold, I noticed that all fountains were in full operation just as though it were summer. I managed to write and mail over 70 postcards to classmates while away, and I have had two notes of acknowledgement. Par? You bet!! One of these came from **Russ Eddy** of Syracuse, N.Y. He is a management consultant in Syracuse and lives on a farm in a suburb, though Syracuse suburbs are a long way from downtown these days. Russ explains that he is now really a 1933 man though he started off as 1932. They have no animals on the farm since the silo blew down, so there is not much use in my promoting Angus with these folks. Russ sees **Jim Mills** often, even though Jim lives near Saratoga, in Galway. Jim is running production and planning for Mohasco Industries, and also runs a milk factory right in his own back yard of several hundred acres. It takes lots of Holsteins to keep the grass down on such acreage. So, it appears, Russ runs far afield in the consulting business.

Cal Mohr now comes through with the Houston Chemical Engineers story of that National meeting. The only classmate Cal mentions seeing was **Bob Dillon**

who visited with Cal and was entertained by him following the presentation of a paper, perhaps by Bob, entitled, "Loss Risks in Large Integrated Chemical Plants." Please recall that Bob is a big man around union carbide, Texas City. Bob is looking for better answers than those given in the papers at Houston. He suggests that if any chemical engineer classmates have such better answers to please get in touch with him. I must assume that the papers will be published in the proper journal. We will hear more from Bob as he goes occasionally to see a married daughter in Chicago, and will on those visits see Cal. Cal also reports that he heard of the following classmates: **Win Partridge, Roland (Rolly) Glenn** and **Mort Williams**. Win did not make the meetings for reasons of his own, but it is rumored that he might have been busy taking advantage of the fine sailing weather. He is in the engineering Department of Union Carbide. Mort Williams is with DuPont in Houston and has two sons, both with doctor of engineering degrees. Cal does not report where these boys picked up the honors. Mort is very active in church affairs and was, even as Cal was in Houston, in the process of installing a new minister. Rolly Glenn is now a vice-president of Union Carbide and gets to Texas often, and sees Bob Dillon during these visits. We hope to hear from Rolly and Win, as we have written each a short note. . . . **Walt Swanton**, reports Cal, has the feature fold-out sheet in the February 13 issue of *Chemical Engineering*, with the title, "An Inexpensive Answer to a Pollution Problem." This is a chromium recovery process listed as patented by Walt and assigned to Pfaudler Company. Also Pfaudler's **Bob Smith** is established in the new Pfaudler Research and Development Building located just off the N.Y. Thruway south of Rochester. Bob says that his development work on Nucerite keeps him traveling a lot, if not too much. . . . Further afield, but still in line, Cal asks if Bill Pleasants has finished his work in developing new Traffic systems for congestion relief. A good question, Cal; see February Review! . . .

For the first time we hear from **Ray Brown** (Raymond T). A short note of direct mail soliciting brought, but quickly, a fine letter from Ray who says that had I waited another day or two, we could not have gotten together, as the Browns were moving March 3 from Greenwich, Conn., to Basking Ridge, N.J. Ray's move came about on account of a job change, from manager of products engineering at Electrolux to consultant in manufacturing services, as a specialist in small motor manufacturing, with Singer. Ray didn't wait, either. Having been warned that the new job might involve some travel, he proceeded to travel 26,000 miles in the first seven months, and as his next assignment he will start commuting between here and France, where a small plant making small motors is being brought up to date. After that he will probably go to Brazil for the same kind of effort. The life, it seems, is hectic but is also satisfying. The Browns were very active in civic work in Greenwich and Armonk, N.Y., but have made up their minds to do a little less of this

and play more golf. Ray does not mention how good he is, but his wife got herself a hole-in-one on a quite difficult hole, and "I am going to have trouble keeping up with her." Son Ronald will graduate from high school a year from June, intends to go on to college and then law school. As a finale, "We expect to make the 35th Reunion—had a swell time at the last one." Now that's about the way we like to start adding up our assets. We will see you both, and it is not too long—15 months. Thanks, Ray.

Well folks, I waited again, and this time I heard from **Al Garnell** on one of my patented reply forms. It is the very first time for Al. We sure enjoy new customers as well as the repeat business. I have just reread Al's story in the 25th Reunion record (Goodridge), and he adds but little. The part that he adds is the 200-acre farm just acquired in Foster, R.I., which comes complete with an 18th century house; the inference is that the Garnells will do some remodelling. Elder daughter Garnell is now Mrs. John K. Birchfield; John is an Air Force captain who has just returned from Vietnam. The young couple is living in Virginia. The younger daughter is teaching in New Hampshire. Al, all of us appreciate hearing from you, and your letter makes it worth while for fellows like me to write for information. Many, many thanks. And why not confirm your attendance at the 35th come June 1968? . . . After a most pleasant trip via "Aeronaves," I landed at Mexico City last Wednesday, March 8, at midnight, and was met at the airport by two Tech men with a large banner on which was sewed "Tech is Hell." Now that looked familiar, so I went right over and met Nish Cornish, '24, and Dick and Jeanne Bolin, '50, the greeting committee of the M.I.T. Club of Mexico City. They represented of course the Club Fiesta, 19th, about to get underway that day. It is a grand feeling to be met in this fashion, no matter where. The Bolins took me right on downtown to the Hotel Del Prado, and Dick even escorted me to the first floor "Reception," making with the proper language to expedite. The story of the 19th annual Fiesta has no place here, as it belongs to the Club itself in its own Club news which will probably make the June issue. It is all most interesting, and they are a great group of M.I.T. boosters. We had one other classmate there, besides yours truly, our eminent Vice-president **Duke Selig** of Houston, Texas. I had but a minute with Duke, and did not again see him as he had left town I was told. So, it was just nice to see Duke once before the next reunion. Again, please read the Mexico City M.I.T. Club news in the June issue. You will be inspired as I



H. Neal Karr, '34, of Darien, Conn., has retired as vice-president and director of The Singer Company after 28 years of service.

was. We have a few address changes coming since the last issue, and we include here the names and course of each. If anyone wishes any address, these or other, please get in touch with me: **Chas. G. Anderson, IV**; **Frank Bleil, VI**; **Frank S. Coyle, II**; **Antonio DeLorenzo, IV**; **John B. D. Mesker, XVII**; **William D. Moore, XIII**; **Stanley E. Oren, XV**; **Samuel C. Prescott, XV**; Professor **Cornelius N. Weygandt, VI**. It is our aim here to get more and more individuals to drop us a line, on the theory that many contributors to the notes is a far better situation than a lot of news about a few. That should make sense, and I would appreciate more direct replies to my letters. Sincerely.—**Warren J. Henderson**, Fort Rock Farm, Exeter, N.H.

'34

Snow is nothing new or exciting to most of you, nor is it to us in the Chicago area—but 36 inches at a time? Much has been published covering our January storm. Those of us that travel had many varied experiences trying to get home from out of town during and after the storm. Transportation was paralyzed. Instead of getting home on a Friday night from Greensboro, N.C., I finally drove to Washington, D.C., and made it from there on Sunday afternoon on the first plane able to land in Chicago in three days. At this writing in early March plowed drifts are still five feet or more high. Spring seems to be far away, but so is the lawn mowing. . . . I received a newsy letter from **George Westefeld** concerning his travels. Although part of the information has been reported previously, I am letting George tell us again in his own words. "Ruth and I sold our home in September 1963 after our daughter went to work in Boston and John finished college and went into the army. We sailed from New York aboard the *S. S. Brazil*, Moore Mac Lines, to Rio de Janeiro where we rented an apartment and lived for a year and a half enjoying the sun, warm weather, etc. As you know, I am in the engineering department of Anaconda American Brass Company of Waterbury, Conn., and was assigned with others to help start up a brass mill near Rio. We stayed there until April 1965 and then flew back via Lima, Peru; Panama Canal; Miami and New Orleans. We had a wonderful trip. When we got back, our daughter was married, and last year our son also got married. So now we are enjoying life in our new home here in Cheshire, Conn., near Waterbury, New Haven and Hartford." George's new address is 14 Glen Court, Cheshire, Conn. 06410. . . . A post card from **Bill Baker** in Bermuda, where he said he went to get away from the ice and snow, showed a picture of two sailing ships, the *Deliverance* and the *Patience*, which were built by Sir George Somers and his men after they were wrecked in Bermuda in 1609. They then sailed the ships to Jamestown, Va. Bill is doing some consulting work on the larger of the two ships, the *Deliverance*. People in Bermuda hope to reproduce it, probably on a concrete base on

shore.—**W. Olmstead Wright**, Secretary, 1003 Howard St., Wheaton, Ill. 60187; **James T. Eder**, Secretary, 1 Lockwood Rd., Riverside, Conn.; **George G. Bull**, Assistant Secretary Mid-Atlantic, 4961 Allan Road, Washington, D.C. 20016; **Kendrick H. Lippett**, Secretary, 8735 Delgany Avenue, Apt. 211, Playa Del Ray, Calif. 90291; **Norman B. Krim**, Secretary, 15 Fox Lane, Newton Centre, Mass. 02159

'35

The only letter this month was from **Allan Mowatt**. "Just a note to bring you up to date! I saw **Dick Jarrell** on the ski slopes at Sunapee, N.H., on Sunday, February 26. He had driven up for the day. His company, Jarrel-Ash, has just completed a very fine year. On Monday, February 27, I was **Bob Forster's** guest at an extremely interesting Alumni Council meeting at the Faculty Club. Professor Roberts from the Sloan Business School of M.I.T. talked on the technical entrepreneur found in the Route 128 complex who had had his start either at M.I.T. Lincoln Lab or the Instrumentation Lab at M.I.T. **Randy Antonson** sat with us; he had just returned from another business trip to England. At the annual meeting of the Weston Golf Club last month I was elected as a director and named chairman of the golf committee. Let me know if I can help you on the notes." . . . How's about it fellows—a deluge of letters with news for these notes? Allan is determined that our class appear in every issue. If we are to appear and if we have no news, I'll manufacture it!—**Irving S. Banquer**, Co-Secretary, 20 Gordon Road, Waban, Mass. 02168

'36

The mailbag this month contains some interesting tidbits. **Doug Cairns** was named oil man of the year by the Vermont Petroleum Association. Doug is president and treasurer of Champlain Oil Company in Burlington, a Citgo jobber. This last should make **Gerry McMahon** happy. Gerry was in Boston and telephoned to bring me up to date on his family. He has rounded out 30 years with what is now Citgo in Lake Charles, La. The oldest son is married and working for General Motors at their proving ground. A son and daughter are in college, and three younger children in high school, junior high, and 6th grade. Ten more years to go to get them all through college! . . . **Louis Proulx**, chief of their air pollution control section of the Connecticut Health Department, is busy acquainting his state's industrialists with the gravity of the situation and practical means of control. . . . **Sidney Speil**, director of corporate research and development for the Johns-Manville Research and Engineering Center, has participated in an Advanced Management Program sponsored by Emory University's Graduate School of Business Administration at the Cloisters

at Sea Island. . . . The **Gordon Thomas** family report a new home address in Pelham, N.Y. (158 Ancon Avenue 10803), effective March 2. Gordon's business address with Stone and Webster is in Garden City at 975 Stewart Avenue. . . . **Robert Leventhal's** Beacon Construction Company is occupying offices in the building they have constructed at 1 Center Plaza. If you haven't been in Boston recently and want to find the address go to where you think Scollay Square should be, look for the Old Howard and you can't miss! . . . **George Donnelly's** address in Westbury, Long Island (11590) is 84 Oriole Way, and **Arthur Peel's** in Rome, N.Y. (13440) is 52 Anderegg Drive.—**Alice H. Kimball**, Secretary, 20 Everett Avenue, Winchester, Mass.

'38

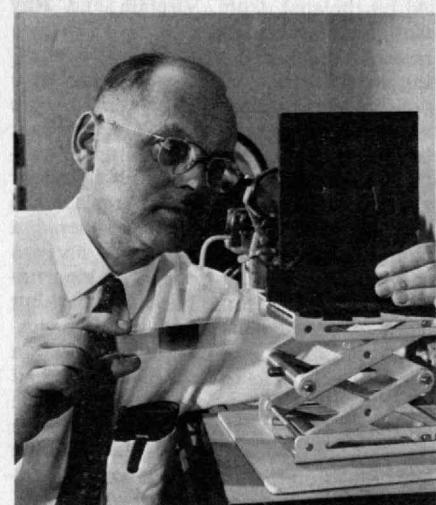
"Block off the dates of June 8-9 for a reunion that should be as much fun as the 25th!" **Paul Black** advises straight from the first meeting of the Reunion Committee on January 30. "At the January Alumni Council meeting a group from the Class of 1938 congregated to initiate some planning for our 30th Reunion. Those attending were **Frank Gardner**, **Lou Bruneau**, **Ed True**, **Horace Homer**, **Jack Bethel**, **Al Wilson**, **Bob Johnson**, **Don Severance**, and myself. After listening to an interesting talk by Dr. Press, Head of the Department of Geology and Geophysics, and agreeing that someone had deleted a few years from our calendars (since we just finished our 25th Reunion!), we got our planning underway. Al Wilson set a new record in parliamentary maneuvering by accomplishing in one breath the moving, seconding, and voting on the establishment of a reunion committee. This duly constituted group consists of Bruneau, Johnson, and Black assisting President Bethel. We are in the process of investigating suitable reunion sites and expect to get the first details to our classmates late in the spring." (Note: Have you seen the announcement? Publication schedules give Paul a running start on these notes, but keep your eye peeled! Check the in-basket, review the pending, and activate the tickler. Right now is the time to get off that note to your Institute Buddy so that you can both protect the dates and shape next year's schedule around a command Reunion!) . . . In addition to his notoriety on reunions, Lou Bruneau on April 1 merged his accounting firm of vonMinden, Bruneau, and Antonson into the firm of Hurdman and Cranston. Lou now has dual headquarters operating out of both the New York and the Newark offices. . . . **Wenzel Wochos** makes the news again, Paul Black reports, with another clipping on promotions. "W. M. Wochos has been named to the new post of executive vice-president of ITT's Cannon Electric. He was vice-president of operations. Mr. Wochos has responsibilities under the president of the firm for all aspects of the operation." . . . "I've just returned from the most interesting and memorable and important experience of my young life,"

(4)

Howard Britton reported, "flying around the world for two months! Went by myself and set my own pace: Tokyo, Hong Kong, and in the Philippines Manila and Baguio City where I went to see and photograph the incredible 'psychic surgery.' On to Bangkok, Calcutta, Karachi, Istanbul, Athens, Cairo (and Luxor). Then Rome and Paris. After five weeks of Far and Middle Eastern civilizations and culture, I fell completely in love with Rome and Paris again. Then Copenhagen, Amsterdam, and London. A really wonderful opportunity, and although I've never really traveled before, I know that this is only the beginning. Don't have the vaguest idea how or when, but I'm sure that it will happen again!" . . . **Homer Oldfield** has been appointed senior vice-president for operations of DASA Corporation, Andover, it was announced by Dick Leghorn, '39, President. Homer had founded the management consulting firm of Rohm-Wheatley, Inc., known for its international activities in the field of information technology, and in that capacity had been a consultant to DASA. Earlier he had been vice-president and group executive of Raytheon Company, and manager of operations Raytheon-Europe. Previously he had established and served as general manager of three General Electric Company divisions: Advanced Electronics Center at Cornell, Microwave Lab at Stanford, and Computer Department at Phoenix. . . . Sorry to report the death of **Fred Klauck** on December 25. Fred had been a development engineer with DuPont in Wilmington, involved with soil mechanics, applied mechanics, engineering materials, and the application of computers to broad areas of engineering design. Fred and Martha have two children, a daughter Wendeline and a son Karl. . . . For a concluding thought about that Reunion—while you're marking out the dates, take the whole swath. Include Friday June 7 to get a running start on the Saturday for-

John Holeman, '38, studies a new kind of lensless, three-dimensional photography, using laser light, which produces "holograms." Holeman is an optics engineer at the Information Sciences Laboratory of the General Electric Research and Development Center.

PHOTO: G.E. RESEARCH AND DEVELOPMENT CENTER



malities, and be sure to include Monday June 10 for Alumni Day on the old camp grounds!—**Frederick J. Kolb, Jr.**, Secretary, 211 Oakridge Drive, Rochester, N.Y. 14617

'39

Martin S. Lindenberg, VI, thoughtfully sent along a clipping about the son of **George J. Thomas**, I, of 416 Rivet Street, New Bedford, Mass. George, Jr., received New Bedford publicity by earning his Doctor of Philosophy degree at M.I.T. and by receiving a grant to study further in London in his medical field. Martin wrote that George Sr. is in business in New Bedford as a civil engineer and is also a professor at the new Southeastern Massachusetts Technological Institute. Martin himself is president of his own firm, Kalco Weaving Company. For spare time activity he and Mary are avid sailors, cruising for several months of the year. Currently he is commander of the New Bedford Power Squadron. The Lindenburgs live at 244 Carroll Street, New Bedford. . . . As a follow-up to the February news item here about the election of **Francis W. Sargent**, IV, as lieutenant governor of Massachusetts, I learned recently that he won his post by a margin of 200,000 votes. A few of Frank's recent activities: commissioner, Massachusetts Department of Public Works; commissioner, Massachusetts Department of Natural Resources; director, Division of Fisheries and Game; director, Division of Marine Fisheries; chairman, Merrimac Valley Flood Control Commission; executive director, the United States Outdoor Recreation Resources Review Commission, under both Presidents Eisenhower and Kennedy; advisor, California Park and Recreation Department. And he is founder-owner of a Cape Cod sporting goods and marine equipment business!—**Oswald Stewart**, Secretary, 3395 Green Meadow Circle, Bethlehem, Pa. 18017

'40

A bit belated from Virginia and **Ray Keyes** comes their annual Christmas newsletter: "It is regrettable that a washing machine has taken precedence over you in our concern at this time. Some water leaking over the floor is not too bad, but when the machine malfunctions—that is something about which to worry anywhere. Ray proceeded to replace the part that the service man considered a common trouble only to find that his own analysis was the right one, a leaking tub seal. Ray got the thing back together, but it agitated and spun-dried simultaneously. It required three hours of work on Christmas Day to correct this. If he had known what he was doing, it would have been adjusted in five minutes. Today is the day after Christmas. The washing machine is on-the-line, so on with the annual Letter. We are not Moslems here,

but the host that recently appeared to worship before Court's rented drum set seemed like the pilgrims had come to Mecca. The house jumped; our ears rang. The real Thanksgiving Day was when the drums were returned. Now we have Court's go-cart that calls the worshippers. We just cannot win! Tim, our Nimrod, will reach his highest passion when the meat on the table is the product of his hunt. He has developed an interest in reading which is so avid that the local library will soon fall short of his desires for outdoor and hunting stories. We are pleased with his dedication, but hope his interest broadens. Greg, our craftsman and trumpeteer, is sprouting like growing corn. It must be that horn-blasting blowing him up. He is going to be our big boy! Kristin is our Terpsichore, muse of melody and dance. She now plays the piano, and "Greensleeves" is her favorite. She will play it for you if you will listen. Although we denied being Moslems, like them we made our pilgrimage to the American Mecca—Disneyland. In a few hectic days, besides Walt's place we visited the Alligator Farm, Knott's Berry Farm, and the Universal Studios. The last is really a deal. They not only profit by movies for TV and Theaters, but also make a wad of dough showing Lana Turner's dressing room and all the leftover scenery since "The Great Train Robbery." It was expensive, but worth it. In 1965 we featured an 8,000 mile cross-country trip. In 1966 we had a 6-mile mountain back-pack. From 7,500 foot Lake Alpine we hiked a jeep road to 6,700 foot Utica Lake."

From **Joe Wiley** comes the following: "Fluid Dynamics, the company of which I am president (and one of the founders back in 1960), recently offered stock for sale and now numbers amongst its stockholders several members of the class of 1940, **Al Castle** of San Rafael, Calif.; **Pete Sosa** of Elizabeth, N.J.; **Paul Keitel** of Morristown, N.J. (who's with Allied Chemical at their beautiful research facilities here in Morristown); and although not yet a stockholder, we've had a survey visit from **Bob Grossfeller**. As another matter of passing interest, the M.I.T. Club of New York recently put on a very splashy affair at the new Philharmonic Hall. Some bright young golden angel had apparently underwritten the entire Symphony Hall and all kinds of people showed up. The Harvard Alumni of New York were also invited, and between Harvard and Tech the Symphony Hall was filled for a very interesting concert by Thomas Dunn and the Symphony Orchestra under his direction. My wife and I went and had the pleasure of meeting up with **Bruce Duffet** and his wife and Tom Cramer, all of which made for a very pleasant evening. If any of the Class of 1940 should become wealthy, I'd recommend a repeat performance."

It is with regret that I must record the death of Major **Sam C. Russell** on December 31, 1966. Sam received his B.S. Degree in Course II. At the time of his death he was attached to the Headquarters of the Eighth U. S. Army. . . . **George Lof** is the author of an article in *Industrial Water Engineering* for December

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1966, on "The Water Demand for Power Plant Cooling." George is head of a private consulting firm in Denver, and specializes in energy and water resource development. . . . **Jack Schaum** is the author of an article on metal casting in the *Detroit Purchasor* for November 1966. The article reviews the metal casting field for the year 1966. . . . **Melvin Jackson** is now director of marketing for the military-products division of Northern Instrument Corporation. Formerly Mel was with Perkin-Elmer Corporation. . . . Interesting geological news has been supplied by **Pat Hurley** at a recent talk before the Geological Society of America. Pat pointed out that the close match in the relative ages of two adjoining geological provinces on opposite sides of the Atlantic Ocean supports the hypothesis that a supercontinent was made up of segments of present day India, Australia, Antarctica, Africa and South America 230 million or more years ago, only to be broken apart later by continental drifts. The rocks of West Africa are divided into two chronologically distinct groups. Those in Ghana, the Ivory Coast and westward are two billion years old. In Dahomey, Nigeria and to the east, the rocks are only a quarter of this age. A similar situation exists in South America with the dividing line located just east of Sao Louis on Brazil's northern coast. The studies strongly suggest that the South American and African formations once composed a single mass. . . . In the meantime do not wait 230 million years to write to Al—**Alvin Gutttag**, Secretary, Cushman, Darby & Cushman, American Security Building, Washington, D.C. 20005

'41

Luke S. Hayden, President of the City Savings Bank, Pittsfield, Mass., has been made the first lay president of St. Luke's Hospital in Pittsfield, the only Catholic hospital in Berkshire County. As a result Hayden, who has been active in Pittsfield civic activities in addition to his bank duties, has been the subject of several feature news articles expressing praise and appreciation for his accomplishments in behalf of the community. At this point we would like to thank **Ivor W. Collins** for bringing these fine new items to our attention. . . . **Charles H. King, Jr.**, has been selected as one of 160 business executives and government officials from the United States and foreign countries to participate in a 13-week course of the Advanced Management Program (AMP) at the Harvard University Graduate School of Business Administration. The course started on February 13, 1967. . . . Professor **Stanley Backer**, Head of the Fiber and Polymer Department of M.I.T., presented a paper on the interaction between yarn and fabric properties at the 16th Technical Conference sponsored by the Hungarian Technical and Scientific Society of the Textile Industry held April 24-30 in Budapest. . . . **Robert M. Fano** was again mentioned in connection with the role of computers in an article

entitled "The Technological Revolution" appearing in the December 1966 issue of *Progressive Architecture*. This time it is in connection with the predicted use of computers in the home.—**Walter J. Kreske**, Secretary, 53 State Street, Boston, Mass.; **Everett R. Ackerson**, Assistant Secretary, 16 Vernon Street, South Braintree, Mass.; **Michael Driscoll**, Assistant Secretary, City Hall, Nantucket, Mass.

'42 25th CLASS REUNION

June 9, 10, 11, and 12

Not much to add about the Reunion but the various committees are hard at work, and from all reports it is going to be a truly lively affair. You still might write to the Reunion Committee at The Academy of Applied Science, Hotel Continental, Cambridge, Mass. 02138, to see if any cancellations have come in so that you can take advantage of them. . . . **Ronald Shanin** has been located by the Reunion Committee after some effort and has agreed to bring to the Reunion one of his color/sound movies made in Africa. He has set up a commercial business photographing wild animals, and those who have seen his movies say they are truly spectacular. . . . **Nanu Amin** is coming to the Reunion with his wife from India, and he is bringing with him Indian hand-craft gifts for all those with advance registration. . . . **Henry Lemaire** who received his Ph.D. in organic chemistry from Cal. Tech. has been appointed as-

sistant professor of chemistry at New Haven College. From 1953 to 1966 he was engaged in research with Lever Brothers, and during part of that time he also taught at Fairleigh-Dickinson College. Earlier he did research for Wyandotte Chemicals. . . . **Robert Higdon** has been appointed a vice-president of Chase Manhattan Bank. He joined the Bank in 1961 after serving as vice-president of the United Industrial Corporation and as president of Haller, Raymond & Brown, Inc. He is technical director for the electronics industry. . . . **Ed Pepper** is here at the Harvard Business School attending the Advanced Management Program. . . . **Warren Twaddle** who is with Amoco Chemicals has been made manager of the propellants division, Seymour, Ind. Apparently this is a more recent appointment than that which we reported in an earlier column. . . . Finally, I have just found out that **Lou Rosenblum** left Itek last November and has set up his own consulting business. He specializes in photographic engineering and in the use of computers for typesetting. See you at the Reunion!—**John W. Scheetz**, Secretary, 45 Rutledge Road, Belmont, Mass. 02178

'44

Willard S. Little, Jr., XVI, now of Timothy Road, Weston, Conn., was named manager of the fuel oil department of Shell Oil Company's Eastern Marketing Region, Eastchester, Conn., effective February 1, according to a release forwarded by the Alumni Association. Will joined Shell at Jackson Heights, N.Y., in 1946 as salesman. He subsequently held assignments of increasing responsibility in New York, Toronto, and Chicago before joining the Eastern region office last year as assistant fuel oil manager. . . . Each month for the past four months we have had one key correspondent to furnish the mainstay of this column. For February it was **Paul Heilman**; for March it was **Dick Kulda**; and for April it was **John Hull**. Paul Heilman has come through again for this month with a trip report, a press release from **Ken Scheid** of Pittsburgh, Pa., and an item from the *Bulletin* of the Harvard Business School with information on **Robert Oppenlander, Jr.**, of Atlanta, Ga. Paul's trip included Chicago. While there he talked with **Lew Tyree**. Lew is a consultant with Liquid Carbonic, and one of his activities has been the development of a number of pieces of cryogenic hardware. Now that these items have been introduced into the market, Lee will be spending more time in the sales area. Lew, with that type of job and with you as secretary of the M.I.T. Club of Chicago, we're looking for some reports out of the Midwest (see February notes). Paul also talked with **Bob Faurot** and said there was activity out there in connection with our 25th Reunion. As reported in the April notes, Bob has agreed to serve as 25th Reunion Gift Chairman. Paul believes that the press release from Ken Scheid's organization would be of general interest to his

classmates, and I agree. Paul is head of Kenneth G. Scheid and Associates, systems and economic consultants to the printing and publishing industry. The firm's address is 5634 Northumberland St., Pittsburgh, Pa. Here we go again with computers. According to the release, "The cost of setting text matter for magazines and books can be reduced 80 per cent when publishers and printers collaborate in the use of computerized phototypesetting. The computer is the key to cost reduction." The system proposed by Scheid and Associates begins with the publisher. Unjustified tape is perforated by editorial typists as a by-product of the regular manuscript typing operation, using tape perforating typewriters. Hard copy is read for typographic errors. A correction tape which includes editorial or authors' changes is prepared. The master and change tapes are combined on a tape merging device in the publishers office. Thus a computer-ready tape is made without any extra labor cost. The clean tape is sent to the printer or trade compositor and processed through a computer where typesetting instructions are added automatically. The resulting tape is then fed to a high-speed phototypesetter that outputs film, or paper positives, for offset, gravure or wrap-around letterpress. The system will also work with tape-driven linecasters. Another press release claims a 50 per cent savings in paper costs by use of web offset printing compared to web letterpress. The key to the cost reduction is the ability to achieve acceptable black-and-white or color quality with web offset on improved, uncoated groundwood stock the price of which is one-third or more below that of coated stock. Very interesting, Ken. For these '44 notes, that correction tape would probably be longer than the master tape. In any case perhaps you could help Review Editor John Mattill reduce the lead time on class notes.

The item from the Harvard Business School *Bulletin* (January-February 1967) includes a photograph and biography of **Robert Oppenlander, Jr.**, as one of several nominees for the executive council of the Harvard Business School Association. Since 1964 Bob has been vice-president for finance and treasurer of Delta Air Lines, Inc., Atlanta. He joined Dleta in 1958 as comptroller. A check of our Alumni Association Directory shows that Bob has not forsaken his undergraduate alma mater. He is an educational councillor in Atlanta and a recipient of the Review. That's about it. Thanks very much, Paul, for your reporting. It helps if one does not have to both gather the news and write the column.—**Paul M. Robinson, Jr.**, Secretary, Navy Department Program Information Center, Pentagon 4D683, Washington, D.C. 20350, 202-OX5-0351 or 7710 Jansen Dr., Springfield, Va. 22150, 703-451-8580; Assistant Secretaries: **Paul M. Heilman, 2d**, Copper Development Association, 405 Lexington Ave., N.Y. 10017, 212-867-6500 or 30 Ellery Lane, Westport, Conn. 06880, 203-227-3469 and **John G. Barnaby**, IIT Research Institute, 1200 17th St., N.W., Washington, D.C. 20036, 202-296-1610

PLAN AHEAD for your CLASS REUNION!!

Mark these dates down
on your calendar

June 9 10 11

AND

Alumni Day June 12

- Renew old friendships
- Relax and enjoy a wonderful week-end
- Then come back to the campus and witness the many changes, see, meet and talk with the faculty and listen to the dynamic seminars on Alumni Day

MAKE YOUR RESERVATIONS NOW

... Full details are on the way



Robert F.
Danner, '47

'47

Our famous class, I believe, has achieved another first. Unfortunately the Waterville Valley Inn, which had been selected for our 20th Reunion in June, was completely destroyed by fire at the height of the ski season. By the time you read this you are probably aware of the change in arrangements to the New England Inn, Intervale, N.H. The response from classmates thus far indicates that we should have a record turnout. A number have indicated that they will combine the reunion with an opportunity to visit college campuses to acquaint their children with New England educational institutions. As a result we should have a goodly number of teen-agers at the reunion. Now for some news. I received a note from F. Alexander Magoun, Secretary of the Class of 1918, indicating that **Reynold A. Grammer** worked on the camera development at Eastman Kodak that took the fantastic moon shots and the earth from the moon photographs. Reynold lives at 139 Baycrest Drive, Rochester. . . . Dr. **Merton P. Lamden**, Associate Professor of biochemistry at the University of Vermont, has received a grant from the U.S. Public Health Service for research on Vitamin C. Prior to serving in the Army in World War II he assisted in the development of powdered lemonade for K Rations. . . . **Henry Lee**, technical director of the Epoxylite Corporation, is the co-author of two textbooks on epoxy resins and one book on high temperature polymers. . . . **Earl J. Anderson** is active in the Department of the Interior's Water Pollution Control Programs. . . . **Robert F. Danner** has been named division procurement manager for Raytheon's space and information systems division. Bob is in a program in which holders of responsible management positions are rotated. With Raytheon since 1951 Bob has been manager of manufacturing for the Waltham operations since 1963. . . . **Eleanor Karasak Shure** who received her M.S. in physics at M.I.T. died recently after a long bout with multiple sclerosis. She taught physics for many years at N.Y.U. She leaves her husband Jerome and daughter Carole. . . . **Robert C. Clement** has been appointed assistant director of the patent division of Shell Development Company's research center at Emeryville, Calif. Bob has been with Shell since graduation and is now a member of the California Bar and the American Bar Association. . . . **Carl E. Dengler** has become product manager with responsibility for "CLYSAR" in the film department of the DuPont Company. Carl was previous-

ly director of DuPont's Yerkes laboratory. . . . A number of classmates have indicated their plans to attend the reunion. Mr. and Mrs. **Robert B. Hildebrand** are coming from Seattle. Bob, '45, is with Boeing, and according to his wife Ginny they spend many spare hours skiing on the slopes of the Cascade Mountains. They plan to attend the reunion with their three children. . . . **Morgan H. Cooper**, Vice-president of Oak Electronetics Corporation, Crystal Lake, Ill., plans to attend the reunion and would be happy to see any alumni near Crystal Lake. . . . **Robert E. McBride** from Elm Grove, Wisc., is vice-president and general manager of Blackhawk Industrial Products, manufacturers of hydraulic components. He was previously in sales for General Electric for 16 years. Bob and his wife Helen have three children and hope to attend the reunion. . . . **Paul Moschella**, factory manager at United Aircraft CSC Division, hopes to attend the reunion. Moe had infantry basic training with me at North Camp Hood, followed by six months at Stanford University, then back to the infantry and to Ft. Benning, Ga., where we ended up going in different directions. Enough reminiscing and back to business. . . . **Donald Dewitt** in Beverly Hills indicates that a fourth child expected in May will probably interfere with his desire to attend the reunion although the distance is only a long weekend by air. . . . **Edward O. Meisner** has moved from Ohio to Trumbull, Conn., where he is now technical director for the Ohio Rubber Company, Stratford plant. This will be his first time at a reunion since graduation. . . . **Bob Peach** says he'll try to make it. . . . **Ben Brewster** is with the Colonial Brass Company in Middleboro, now has four children and hopes to see us in June. . . . **David B. Lull** is now at GCA. He and Sylvia have four children, ski when there is snow and surf when the lifeguards go home. . . . **Meyer S. Rosenthal** hopes to be there. . . . So does **Alex Giltinan** of Charleston, W.Va. . . . **Steve Evans** of Newtonville is currently supervisor of value engineering at Sylvania in Needham and hopes to attend. Steve and his wife Evelyn have two daughters, Nancy 17 and Susan 2. . . . **John Kellett** says to keep him posted since he may have chance to attend. . . . **Carl Eyman** is still in the candy business in Louisiana as general manager of the Howard Stark Company. . . . **Hunter M. Bennett, Jr.**, attorney at law in Weston, W. Va., hopes to attend the reunion. . . . **Robert W. Devine, Jr.**, will be there from New York City. . . . So will **Ken Marshall** from St. Louis. . . . **Jack B. Lehmann** of Stamford will attend. Jack has four children and is national sales



PHOTO: MATAR STUDIO

Loris M. Diran,
'48, manager of
metallurgical ser-
vices of the In-
ternational Nickel
Company, Inc.

manager for Robert Rollins Blazers, Inc. . . . Lt. Col. **Robert T. O'Brien** is in Vietnam and can't make it this June, so is **Richard Dreselly**, with Metcalf and Eddy. . . . That's the end of the mail for this month.—**Martin M. Phillips**, Secretary, 41 Avalon Road, Waban, Mass. 02168

'48

We have recently begun the practice of soliciting news for these columns by means of double postcards which are sent to each member of the class on which we receive a change-of-address notice from the Alumni Office. The response has been most gratifying, and we thank all of you for your cooperation. We learned via double postcard that **Thomas Cantwell** is vice-president and technical director of Mandrel Industries of Houston, Texas. He, wife Janice, and their three children, Thomas 9, Betsy 11, and Douglas 6, live at 3061 Locke Lane, Houston 77019. . . . Colonel **Robert S. Day** is director of admissions at the U.S. Military Academy at West Point. He also holds the position of registrar at the Academy. He is a member of the board of trustees of the College Entrance Examination Board. Col. Day, his wife Marjory and their three sons, Scott 14, Bill 12, and Bob 7, live at 34 Thayer Road, West Point, N.Y. 10996.

. . . **Stan Ehrlich** is with Raytheon Company, Submarine Signal Division. He supplements his professional activities with his hobbies, stamp collecting, reading, and swimming. Stan and his wife Louise have three children, Barbara Ellen 15, Stephen Mark 12, and Michael Alan 8.

. . . **Fred Firestone** and wife Lois are proud of their Julie, aged 2. Fred is associate professor of economics at Scripps College and Claremont Graduate School, Claremont, Calif. . . . **Mark Kirchner**, wife Mary Lu, and their three (what gives with this magic 3?) children, Scott 8, Brad 5, and Terri Lee 5 months, live at 14 Lakewood Drive, Media, Pa. 19063. Mark is with the Vertol Division, Boeing Company, in their engineering department. His primary avocation is private flying. . . . **Webster Padgett** is with Esso Research Laboratories of the Humble Oil and Refining Company. He and Doris have three children, James 12, Ann 11, and Glen 5. . . . **Verity Smith**, our Class Treasurer, lives with his children at 561 Bridge Street, Dedham 02026. The children are Brooks 14, Taylor 12, Carlan 11, Nathan 9, and Margo 2. Verity is vice-president of the Barnstead Still and Sterilizer Company. . . . **John A. Worton** is with General Dynamics, Quincy Division, Quincy, Mass., after having been transferred from the Electric Boat Division in Groton, Conn. He, wife Susan, and Harriett 8, James 6, Beth 4, and Sarah 3, live at 21 Daedalus Circle, Scituate, Mass. 02066. . . . I quote from a letter from **Charles N. Deane** of Walter M. Gaffney Associates, Inc., Hyannis, Mass. 02601: "Until March 1958 I was employed as an architect with a Boston engineering firm, becoming chief architect in 1956. From March 1958 until the present I have been with Walter M. Gaff-

ney, Associates, architects, in Hyannis. Last year I became vice-president of the firm and am now a part owner. My wife Betty and I have two daughters, Cheryl and Judith, and we live within the National Seashore Park in Eastham here on dear old Cape Cod. I must confess that I didn't make our 10th or 15th reunions, but have hopes for the 20th." We will look forward to seeing you then, Charles. And speaking of the 20th Reunion, **Dick Harris** reports that the Class of '48 had a table at the January 30 Alumni Council meeting. Present were **Ben Brettler**, **Marty Billet**, **Ken Brock**, **Adolf Monosson**, **George Wayne**, Verity Smith, and Dick Harris. I quote from Dick's letter: "Most of the discussion centered on whether Treasurer Verity Smith knew what we had in the class treasury and whether Reunion Chairman Sonny Monosson should be sent to check the Virgin Islands or the Bahamas as a proper location for the 20th." (Why not Tahiti?) "For a full report on the matters discussed, we suggest coming to the 20th Reunion in 1968 (wherever it is held)."

And now for the collection of interesting clippings from the Alumni Office. In the November 1966 issue of the *Journal of Housing*, **Morton B. Braun** was co-author of an article entitled "Scale Models Are A Necessary Public Relations Aid for Urban Renewal." The article discussed some practical considerations involved in preparing for the design, construction, and presentation of scale models. Mr. Braun is president of the Planning Services Group, Cambridge, Mass. He has been a consulting planner since 1955. . . . **Mark E. Connelly** was the author of an article in the November issue of *Simulation*. The title: "An Analog Photoresistive Multiplier." I quote from the abstract: "An inexpensive, yet accurate, analog multiplier producing seven products of a common variable has been developed and tested successfully. The device utilizes resistance variations in an array of eight photoresistive cells illuminated by a single incandescent lamp, the light level of which is controlled by the common multiplier." Mark has worked on the numerical control of machine tools, the Porcupine fire control system, the Project Lincoln Summer Study on Continental U.S. Air Defense, the formulation of an efficient set of aerodynamic equations for aircraft simulation, and the application of hybrid computation techniques to various intractable problems, all at the Electronic Systems Laboratory of M.I.T. "Having started out life in Concord, N.H., I now find myself living in Concord, Mass., surrounded by my wife, four children, a cat, a guinea pig, an acre of weeds, and nice neighbors. As an antidote to engineering research, I have served as a Great Books discussion leader off and on since 1948. This activity has greatly enlarged my circle of confusion. An even more humbling experience has been my career as a part-time tennis bum. After years of hot endeavor I remain enthusiastic, hopeful, and unranked." . . . **Martin J. Klein**, acting head of the physics department at Case Institute of Technology, was the author of an article in the November issue of *Physics Today*.

The title: "Thermodynamics and Quanta in Planck's Work." . . . **J. J. Kotlin** of 4611 Cumnor, Downers Grove, Ill., has been named assistant chief engine design engineer at Electro-Motive Division of General Motors, McCook. . . . **William A. Lockwood** has been appointed a senior vice-president to head a newly organized group in First National City Bank's Specialized Industries Division. Bill joined the Citibank petroleum department in 1956. He is a director of the Independent Petroleum Association of America and a member of the American Petroleum Institute, the petroleum clubs of Tulsa and Houston, the University Club of New York, and the Sleepy Hollow Country Club of Scarborough, N.Y. . . .



R. W. Pickles, '48

Perry L. Nies, 4 Norris Road, Lynnfield, has been appointed vice-president of marketing by the Craig System Corporation. He joined Craig in 1954 and was director of marketing and an assistant vice-president prior to his promotion. Perry is chairman of the trustees of the Lynnfield Library and chairman of this year's reunion of the Harvard Business School class of 1952. He and his wife Jane have three children: Nancy, Betsy, and David. . . . **R. W. Pickles** has been promoted to manager, Plant Services Division, of the Foxboro Company. He was previously plant engineer at Plymouth Cordage Company, Plymouth, and he and his family reside on South Station Street in South Duxbury. . . . **Frederick G. Shuman** of the Environmental Science Services Administration (ESSA) received the Department of Commerce Gold Medal for outstanding government service. Dr. Shuman won the award for his contributions to the science of numerical weather prediction, his distinguished authorship, and his leadership as director of the Weather Bureau's National Meteorological Center at Suitland, Md. He is credited with successfully developing and putting into operation the numerical model of the atmosphere necessary for computer-produced weather predictions made at the Center. Dr. Shuman has directed operations at the Center since 1964. He and his wife Elena live at 212 Inverness Lane, Silesia, Md. . . . At a January meeting of the Hartford Chapter of the National Association of Accountants, **Thomas P. Waldron** spoke on the topic, "Business Analysis and Planning." He is business planning and analysis manager of General Electric Company in Plainville, Conn.—**Robert R. Mott**, Secretary, Kent School, Kent, Conn.; **John T. Reid**, Assistant Secretary, 22 W. Bryant Ave., Springfield, N.J.; **Richard V. Baum**, Assistant Secretary, 1718 E. Rancho Drive, Phoenix, Ariz.

'49

Let me start these jottings with the cordial hope that Nell and I will see a good many of you at Alumni Day, June 12. We think it will be fun and are anxious to know what the big surprise is going to be at approximately 4:30 P.M. Only **Bob Cowen** knows. Last year it was a showing of the movies taken of one satellite from another. At 5 p.m. the class is having a cocktail party in the penthouse of McCormick Hall, and from there we will drift at about 6 P.M. to a general party outdoors between Kresge Auditorium and the new Student Center. At 7:00 there will be a truly delicious dinner in Rockwell Cage followed by entertainment of various kinds for the rest of the evening. You will receive more adequate information, if you have not already received it by the time you read this. Do plan to come! You wouldn't believe all the miracles which have happened since we were there. . . . **Ed Dinowitz** has been appointed associate director of engineering for Epsco, Inc., a firm which has pioneered in the design and implementation of analog-to-digital computer systems and techniques. Ed lives in Needham, Mass. . . . **Jesse Clamp** has been elected a senior vice-president of Allis-Chalmers in Milwaukee, Wis. Before joining Allis-Chalmers in 1963 he had been director of corporate planning and development for General Mill, Inc., Minneapolis, Minn. Before that he taught at M.I.T., Duke University in Durham, N.C., and Florida State University in Tallahassee. Also he served as regional director of the War Stabilization Board in Dallas, Texas, and Kansas City, Mo., and was director of personnel for Armour and Company, Chicago. . . . **John Sutherland** has been named manager of the Fisher Body assembly plant at Willow Run, Mich. Upon graduation he joined Fisher Body as a student-in-training at the General Motors general offices in Detroit. In 1953 he was transferred to the Euclid, Ohio, plant where he was made chief inspector of assembly operations. In 1954 he transferred to Flint, Mich., and served as production engineer, general foreman, chief inspector and tool and die superintendent. John is married and has one child.

Bill Howlett, whom we remember most pleasantly from our days on the student staff at Walker Memorial, represented the Institute on March 2, 1967, at the Charter Day Convocation commemorating the 100th anniversary of the founding of Howard University. Bill is president of the Union Iron Works Company in Washington, D.C. . . . **George Conant**



Edward E.
Dinowitz, '49



Fred A. Plemenos,
'51, Raytheon Company, deputy engineering manager of the Poseidon program.

has been appointed a senior scientist by the Arcon Corporation of Wakefield, Mass. George is a specialist in circuit analysis, microwave radiometer simulation, satellite tracking and data processing of rainfall and seismographic-array. He is currently working toward a Ph.D. in astronomy at Harvard. Arcon Corporation is an independent research organization specializing in the solution of problems of analysis and design of complex guidance and control systems, communications and information processing systems. George lives in Wellesley, Mass. . . . Commander Earl Fowler has recently completed a nine-week course in defense weapons systems management under the Air Force Institute of Technology (AFIT) education program at Wright-Patterson A.F.B., Ohio. He is now back at his duty station at the Pacific Missile Range, Point Mugu, Calif., where he is head of the ships engineering division. Earl received his B.S.M.E. in 1946 from Georgia Institute of Technology and his B.S.E.E. degree in 1949 from Tech. He is married to the former Helen M. Jorgenson. . . . Numerous learned papers come my way which are written by '49ers, and I never cease to be staggered by these glimpses into the astronomical vastness of knowledge. A case in point is George Pratt's article written with two others on "Direct Frequency Modulation of a Semiconductor Laser by Ultrasonic Waves," which appeared in the *IEEE Journal of Quantum Electronics*. George is with the Materials Theory Group, Center for Materials Science and Engineering, M.I.T. . . . Randy Cleworth has been transferred to

Mark K. Smith, '51 (center), has been named president of Geophysical Service, Inc., vice-president of Texas Instruments, Inc., and manager of GSI's Science Services Division; he has previously been GSI vice-president for research, development and engineering. In the picture above Dr. Smith is conferring with GSI's new top command—Robert Dunlap, chairman of the board, and Richard Rainey, executive vice-president.

PHOTO: GSI GRAPEVINE



Chicago by Link-Belt to work in the central engineering department. This department backs up the various plants' engineering departments, especially on large or development type projects.— Fletcher Eaton, Secretary, 42 Perry Drive, Needham, Mass. 02192

'51

David Atlas, one of the world's leaders in the field of radar meteorology, has been appointed professor of meteorology in the department of geophysical sciences at the University of Chicago effective September 1, 1966. He was chief of the weather radar branch, Geophysics Research Directorate, Air Force Cambridge Research Laboratories. He has received many awards. David received his master's degree with the Class of '51 and later earned a Sc.D. from the Institute. . . . **Eugene N. Babb**, who is now the manager of advanced program development at Hughes Aircraft Company, is one of the four M.I.T. Alumni in the class of 45 Alfred P. Sloan Fellows at the Institute for the 1966-67 executive development program in the Sloan School of Management. . . .

Marvin L. Baker was recently promoted to be manager of Elastomer Development at the Shell Chemical Company's Synthetic Rubber Technical Center at Torrance, Calif. He reports that the field is going through a major revolution. Shell has just introduced a unique rubber which requires no vulcanizing. We trust that he spends time with wife Arlene and sons Theodore 7 and Peter 4 while leading the revolutionary forces. . . . **Marvin Burns** is at the IIT Research Institute where he manages the space systems group. The group is concerned with space science instruments and medical engineering devices for research, diagnostic and surgical use. He enjoys "good suburban living" in Wilmette with his wife Marcia and Sandra Jean 3½ and Stephen Michael 1½. . . . **G. M. Colvill**, his wife Jacqueline and children, Tracy 12, Sydney 8 and Robert 6, still live in Cincinnati where he is the field sales manager for Tool Steel Gear & Pinion Company. Snipe sailing and skiing occupy time not spent traveling for the company in the U.S., Canada and Europe. . . . **John W. Conley** is now vice-president of planning for American Forge, Inc., of Chicago. He lives in Olympia Fields, Ill., with Mary, John 3, and Mark 2. He enjoys golf but recently interrupted his game to visit Japan and set up a licensee. . . . **John T. Degnan, Jr.**, joined United Aircraft Research Laboratories as a senior research engineer to perform economic studies of transportation systems. He and Julie have two children, John III and JoAnn. . . .

Bill Gable is vice-president, engineering, at AAI where he is responsible for electronic systems work. His sons Steve 14 and James 9 must be proud of him for his work in civic, educational and church affairs. Last summer he and his wife Hattie spent six weeks in Europe touring eight countries. . . . **Henry Hahn** is the manager of the metallurgy and Ceramics Laboratory at Melpar, Inc. He and Mari-

lyn, Anita 9, and Jeff 6 live in Fairfax, Va. . . . **John S. Karbowski** received a master of science degree in mechanical engineering from Carnegie Institute of Technology last June.

Fred G. Lehmann has a great deal to report. However, an edited version follows. Fred is the secretary of the M.I.T. Alumni Association. His most interesting current task is the Long-Range Planning Committee which is peering through the next ten years toward long-range goals and programs. How well they see will have profound consequences for us and the Institute. The Lehmanns, including Betty Ann, Karl 9, Pamela 7, Karen 4, and Andrew 2, will camp anywhere. They have been to 38 states and 6 provinces (of Canada presumably). They have not finished the three bedroom house expansion. (That is better than those of us who are procrastinating starting). . . . **Bob Gooch** and his wife Rachel apparently couldn't make the reunion, but they did make a "special" one at the Lehmann's at the end of July. . . . **Jerry Marcus**, his wife Judith and children Edward 7, Lisa 5, and Stephen 3 live in Needham, Mass. They enjoy sailing, skiing and bridge. Jerry is vice-president of Production Systems, Inc. . . . Analytical work carried out by **S. M. Nagy** and associates at the Microchemical Laboratory at M.I.T. was referenced in an article in the July issue of the *Journal of Organic Chemistry*. . . . **Russell W. Osborn, Jr.**, is the production engineering manager at the Jarrell-Ash Company of Waltham, Mass. He and Rita and children Kevin 6, Brian 10, Mary Anne 5, and Eric 3 live in Newbury.



John J. Singer, '51, Holland-Suco Color Company, research director, flushed colors.

Sydney R. Parker, his wife Dorothy and their children Stephen 19 and Susan 17 are in Monterey, Calif., where he is a professor in the electrical engineering department at the U. S. Naval Postgraduate School. . . . **Daniel R. von Recklinghausen**, his wife Carolyn and their children Friedrich 6 and Christoph 4 live in Arlington, Mass. Dan is chief research engineer at H. H. Scott, Inc., where interesting projects are "all that come along." . . . **John M. Salzer**, who received his Sc.D. with the Class of '51, has been elected vice-president of technology and planning of the librascope group of General Precision, Inc. . . . **Clinton B. Seeley**, is a physician, radiologist, associated with the Massachusetts General Hospital. He and his wife Gail and Laura 9, David 7, Paul 5, and Kathryn 3 live in Andover, Mass. . . . **Lloyd G. Smiley** and his family, Connie and Catherine 19, Patricia 16, Joan 13, and Kevin 11, live in Poughkeepsie, N.Y. Lloyd is president of the Marketing Distribution Council. He flies a S-35

Bonanza more than 400 hours a year. He wrote some nice things about the role his wife has played throughout his career. They were words that most of us could readily echo. How many of us ever do so that our wives can hear? . . . **Alden N. Tschaeche** is technical director of Technical Associates, Burbank, Calif. He and his wife Helga have three children, Ray 10, Joan 8, and Patrick 4. . . . **Louis Weinberg** was pictured in the June issue of the IEEE's *Transactions Circuit Theory*. He received his Sc.D. with the Class of '51. He has had a distinguished career and is presently a professor of electrical engineering at the City University of New York. . . . **J. Harry Wolf, Jr.**, his wife Joyce and their children, John 9, Elizabeth 8, Scott 4, and Jennifer 3, live in Wilton, Conn. He is a computer applications engineer with the Arabian American Oil Company. His home and family consume his spare time. Hobbies will wait till later. This month's author—**Marshall Alper**, Assistant Secretary, 1130 Coronet Ave., Pasadena, Calif. 91107; **Howard L. Livingston**, Secretary, 358 Emerson Road, Lexington, Mass. 02173; Assistant Secretaries: **Walter O. Davis**, 346 Forest Ave., Brockton, Mass.; **Paul G. Smith**, 11 Old Farm Rd., N. Caldwell, N.J. 07007

'52 CLASS REUNION

June 9, 10, and 11

Six inches of snow grace the landscape as I write and still it sifts down on this second day of spring! When you read this, though, our 15th will be a scant month away. Presumably you have received four mailings and quite possibly a call from a classmate concerning your attendance at the Wychmere Harbor Club (formerly Snow Inn) in Harwichport on the weekend of June 9-11. Chances are that you have: 1. decided to attend 2. decided not to attend 3. decided not to decide. The following then is intended for those in the third category. What besides the nominal cost can you look forward to in June? Cape Cod, salt air, camaraderie (or gossip, if you prefer), clean white sandy beaches, fishing, loafing, salt and fresh water bathing areas, seeing pleasure boats of all varieties enter and leave the captivating, man-made harbor, delicious food and drink, gracious accommodations, ample facilities and opportunities for the sports-minded—all in all an exceptional setting in which to rejuvenate spirits worn ragged by the routine. You may become a lord (or a lady) who bids the world come to you, or you may become a knight who rushes out of the castle to do battle. It makes no difference at the Wychmere Harbor Club. Since its establishment in 1892 it has been managed by the same family. They understand. So do come. If you haven't yet returned your registration material, pick up the telephone now and call **Doug Haven** collect at 617-864-1256 during the day or at 617-235-8184 during the evening. We want to see you and your lady again in June.

And now for a few items of news from classmates. Nice letter from **Jack Larks** who is now systems marketing representative in Houston with Thompson Ramo

Woolridge. Jack seems to keep very busy coupling his professional career with a wide group of outside interests including remaining active as a major in the Army Reserve, artillery research and design group, serving M.I.T.'s Educational Council, and pushing on with flying where he has logged over 200 hours. . . . **J. Cranston Gray**, formerly general manager of the Porterdale division of Bibb Manufacturing Company, has been appointed vice-president for operations of the Canton Textile Mills, Canton, Ga. . . . **Gerald W. Poirier** has been promoted to product manager of foundry for Erie Forge and Steel Corporation, Erie, Pa., where he will work in casting development and applications. . . . **Walter Roth** writes in that he is now chief architect of the Washington Planning and Service Center, National Park Service, Department of the Interior, Washington, D.C., and is now living in Alexandria. . . . Two of our classmates are members of the Consulting Engineers Council, a national organization of engineers in private practice devoted to advancing the profession of consulting engineering. **Franklin Y. K. Sunn**, president of the firm of Sunn, Low, Tom and Hara, Inc. and of Hawaii Architects and Engineers, Inc., both of Honolulu, has been elected a vice-president of the Consulting Engineers Council of the United States. Besides being active professionally, he is exceedingly active in many civic and community affairs and in 1964 was the recipient of the Hawaii Engineer of the Year Award from the Hawaii Society of Professional Engineers. **Brice R. Smith, Jr.**, was elected president of the Consulting Engineers Council of Missouri. Brice is treasurer of Sverdrup and Parcel and Associates, Inc., of St. Louis. And that is that, and unless the June issue is out early, will plan to see you all at the Reunion.—**Dana M. Ferguson**, Secretary, Box 233, Acton, Mass. 01720

'53

On February 28 a meeting was held at A. D. Little in Cambridge to discuss plans for our 15th Reunion—God save us! At this meeting we held a strong delegation of Course XV men including **Ed Fahey**, **Dick Lindstrom**, **George Hegeman**, in addition **Dick Chambers**, XVII, and your faithful Secretary. We have at the moment under consideration three locations which are in order of preference: Bermuda, Martha's Vineyard and Cape Cod. The possibilities for an unusual and perhaps quite memorable trip to Bermuda are being seriously considered and arrangements for chartering a Pan American jet from Boston with a stop-off in New York is being investigated as regards price. In addition we are exploring the possibilities for price advantage to those who may wish to extend their visit to Bermuda either before or after our reunion. We expect to notify you both through this column and through a separate mailing in regard to all of the facts we can accumulate relating to the alternatives and ask for your comments and suggestions.

Since hotel bookings must be made so far in advance, we would appreciate receiving any suggestions and comments which you may have. We really want to make this a bang-up event. It turns out that at this meeting I found myself in the company of some leading authors! Ed Fahey is co-authoring a book which will be published shortly by Random House. The name of the book is *Congress Needs Help*—and I am sure that no one will disagree. Some of you may remember the Huntley-Brinkley special last year on this very subject involving A. D. Little's study in this area. In order to prove that not only blondes and Course XV have fun, Dick Chambers has authored a chapter "Reinforced Plastics" which is included in a book entitled *Plastics and Buildings* edited by Skeist and published by Rheinhold for could you believe \$17.50! . . . **Harold T. McAleer**, VI, is currently a development manager at General Radio where he designs frequency counters and associated instruments and systems. After receiving both a bachelors and masters degree at Tech, he spent two years as an engineer for the U.S. Army Signal Corps at Ft. Monmouth, N.J. Harold is a registered professional engineer and a member of IEEE, Eta Kappa Nu, Tau Beta Pi, Sigma Xi, GEE!

The following address changes have been received: Rev. Thomas F. McMahon, II, Maryknoll Seminary, Mountain View, Calif. 94040; Ronald F. Harris, III, 2624 Sample Road, Allison Park, Pa. 15101; John T. Harding, Jr., VIII, 807 Aleppo Street, Newport Beach, Calif. 92660; George E. Grenier, V, 360 So. Virginia Avenue, Pasadena, Calif. 91107; Leonard B. Gross, III, 1115 Craigmont Dr., Lynchburg, Va. 24501; Donald A. Gordon, VIII, River Road, Carlisle, Mass. 01741; Kenneth R. Geiling, III, 266 Spring St., Sayre, Pa. 18840; Robert E. Esch, VI, 2391, Hemphill Rd., Dayton, Ohio 45440; Bernard Edelman, VI, Information Machines Corporation, 500 Cypress Lane, El Cajon, Calif. 92021; James J. Crowley, XV, 7 Vincent Drive, Simsbury, Conn. 06070; Dr. Theodore H. Bodner, X, 1190 The Strand, Teaneck, N.J. 07666; Ralph S. Block, X, 10 Farragut Drive, Piscataway, N.J. 08858; Michael A. Alexander, XV, 221 Bullard St., Walpole, Mass. 02081; Michael D. Stanfield, X, 4 Sunrise Dr., Warren, N.J. 07060; Stuart Solomon, III, 11405 Blenden Lane, Richmond, Va.—**Norman R. Gardner**, Secretary, 100 Memorial Dr., Cambridge, Mass.

'54

As reported in the January issue brief questionnaire cards are sent to those of you for whom address changes are received. The response has been very good to date, and I am hoping to continue tapping this source of news. **Joseph Brazzatti, Jr.**, has relocated to the New York office of Mobil Oil Corporation to act as supervisor of environmental analysis. . . . **Daniel F. Farkas** has a new job as research chemical engineer, U. S. Department of Agriculture in Albany, Calif. Dr.

Farkas, wife Alice, and children Brian and Douglas have recently moved from Geneva, N.Y. . . . **Peter Hetzler** is assistant vice-president, Marsh and McLennan, New York, N.Y. . . . **Frederick L. Hofmann** is now a major in the U.S. Air Force. Fred, wife Joan, and daughters Annette 8 and Lesa 6 have moved to San Bernardino, Calif. . . . **Emile H. Houle** is manager of process development at Memorex Corporation, Santa Clara, Calif. Memorex manufactures precision magnetic tape. . . . **Joseph Hurley** is plant manager at Corning's Canton, N.Y., plant. Joe is active in the ASME and Rotary and enjoys sports cars, hunting, fishing, and golf. . . . **Gerald D. Jackson** is president of Jackson Realty Company in Hartford, Conn. . . . **Arthur Jacob** is a patent attorney, Samuelson and Jacob. . . . **Peter Paul Luce** is an engineer with Wofac Corporation, management consultants in Haddonfield, N.J. . . . **Steve J. Poulos** reports that he is still at Harvard and that his wife Theodora and children, Jennifer 20 months and Gregory 3 months, have a new home in Winchester, Mass. . . . **J. Robert Peters** is manager of factory accounting at Ingersoll Rand Company. . . . **Arthur Sargent, Jr.**, has just been promoted to major and is now flying a C130 out of Formosa for a year. Art received his master's degree from RPI last June. . . . **Eddie Schwarz**, who was mentioned in the January column as back in Texas, is one of our private pilots who owns and operates his own aircraft, a Navion. Ed is making recurrent trips back to M.I.T. to recruit graduates for LTV. . . . **John Mitchell Stoddart, Jr.**, has been foundry manager at the Manheim, Pa., plant of the Fuller Company since October 1965. John, wife Ann, and children Cheryl Ann 8½ years, Diane Marie 5 years, Karen Lynn 3 years, and Dean Mitchell 14 months live in Lancaster, Pa. The Fuller Company is a division of General American Transportation Corporation. . . . **Daniel F. Tully** is an architectural engineer and active in ACI, CECNE, IASS, and the Melrose Rotary Club. . . . **Paul P. Valerio** is at Paul P. Valerio Associates, New York, N.Y. . . . All of the news this month represents recent changes of address. I would be happy to pass along up-to-date addresses of classmates upon request. I have recently prepared listings of class addresses in specific sections of the country for classmates planning trips.—**E. David Howes, Jr.**, Acting Secretary, Box 66, Carlisle, Mass. 01741

'55

The holiday season brought us some wonderful notes from a few classmates. Sally and **Chan Stevens** moved last fall into "a white elephant painted brown" and have since been besieged by painters, plumbers, etc. Chan claims they can sleep in a motel and accept all credit cards if anyone gets lost in the Mansfield area. . . . **Bill O'Neil**'s wife Jacqueline wrote in December that Bill is chief industrial engineer for SOMISA, the first fully integrated steel plant in Argentina, setting up their

industrial engineering department. They are there on a contract basis, having now completed four out of five years. Bill received a master's degree in 1961 from the University of Colorado and is now father of three, Perry 6, Cathy 4, and Thomas 3. . . . **Ralph Wanger** seems to be prospering in Chicago as vice-president of Robert J. Levy and Company, Inc., "a small stock brokerage firm, doing security analysis for the most part." He and Phoebe (Steele, Radcliffe, '58) and "two excellent sons," Eric 4 and Leonard 1, have a town house in north Chicago near Wrigley Field and the Lake. . . . Also back in Chicago again is **Eric Theis** who in January was appointed general order manager, machinery division, of Joseph T. Ryerson and Son, Inc. Eric and Laura returned to Chicago from St. Louis, now accompanied by three children. Not too far away in Glen Ellyn **Gordon Lohman** lives with his wife and two daughters. In December he was named director of research of the AMSTED Research Laboratories in Bensenville. . . . **Pete Peterson** took time out to write of his activities since he left Honeywell in 1961 for UCLA. He got a master's degree in 1963, then joined Ford where he is presently supervisor of operations research on the corporate staff. (You can read all about it and even see Pete's picture in the January issue of *Future*.) Pete and Mary now have a three-year-old daughter Julie in addition to Stephen 10 and Brad 7. . . . **Michael Horstein** is in California and has been since receiving his doctorate from M.I.T. in 1960. Presently he is a senior staff engineer in the Space Systems Division of Hughes Aircraft Company in El Segundo. During 1961-62 he was also a lecturer at UCLA. . . . Several others are currently teaching and/or doing research at various schools: **Stanley Engelsberg** is in the physics department at the University of Massachusetts; **Donald Burress** is at the University of Oregon Medical School in Portland; **Buck Brown** at Louisiana Polytechnic Institute at Ruston; and **Paul Haberfield** at Brooklyn College. A few who have added the title of Dr. are **Martin Shooman**, Glen Cove, N.Y.; **Paul Ing**, Poughkeepsie; **Martin Cooperburg**, Far Rockaway; **Surendra Shah**, Montreal; and **Michael Ginsburg**. . . . **John Prentice** is now Capt. Prentice, and **Rodney Logan** is no longer Capt., but Major. We'd be interested in details of these and other changes of title, and other changes in your lives.—Secretaries: **Dell Lanier Venarde** (Mrs. J. H.), 16 South Trail, Wilmington, Del. 19803; **L. Dennis Shapiro**, Aerospace Research, Inc., 130 Lincoln Street, Boston, Mass. 02135

'56

Guy Spencer reports that on a recent trip to Akron he visited with **Mary Bahnman** and **Joe Huber**. Mary started and is operating a flying club which now has 75 members and five airplanes. Meanwhile he still works at Goodyear Aero. Joe works for the same organization and is gravitating towards selling the radar equipment he designs. . . . **Dick Miller**

writes that he is in technical sales development with Union Carbide in Atlanta. He is also president of the local alumni club. Since Tech, Dick has acquired an M.B.A. from Michigan, was married in 1957 and has two sons, Jeffery and Gregory. Among the local alumni is surgeon **Ed Johnson**. . . . **Barry Brown** writes that he uses his Tech education every day—as president of his own motion picture producing company, Brillig Productions, Inc. Barry is a well-known New York TV commercial photographer and has won a number of awards for his unusual effects. He spends quite a bit of time on location in Europe and expects to make a feature movie there soon. Last fall he was divorced but remains close to his two young daughters. . . . **Tom Doherty** writes that he enjoys being an architect in the dynamic atmosphere of Toronto. Tom attends the meetings of the active local alumni club where he frequently finds **Phil Bryden** taking time off from his teaching. . . . **Bob Mansperger** has pointed out that **Russ Schweickart**'s picture was in the February 3 issue of *Life*. Russ is a member of the primary crew on the second Apollo flight. . . . **Mohamed Sadli** was featured in a syndicated column appearing in the U.S. papers last December. Mohamed is one of five Indonesian economists trying to bring some order to the financial chaos that has struck that nation. . . . Last June **Harry Pople** was awarded a masters degree in industrial administration by Carnegie Tech. . . . **Jerome Vielehr** has returned to the U.S. to work for the Coca Cola Company, in Atlanta. Jerry had spent several years in India as part of the Tech task force helping establish the Indian Institute of Technology at Kampur. . . . **John Hofmann** has been appointed head of the exploratory section of process research at ESSO Research & Engineering. He is the author of a number of papers on organic chemistry and holds two patents. John is married and has a son and daughter. . . . **Joseph Hamlet** writes that he is an assistant district manager for petroleum sales for Humble Oil. Joe is married and has three children. He moved to New Jersey from Vermont last year. . . . **Kreon Cyrus** has written us a chronology since graduation. From '56-'58 he spent two years in Korea as a combat engineer. For the next three years he worked on construction jobs for Stone & Webster and Metcalf & Eddy. Then back to Tech for a masters with a specialty in computer applications in civil engineering. He remained at Tech in the Instrumentation Lab to work on the Apollo project. In December 1966 he joined the M.I.T. planning office as project director of special studies. Kreon was married in 1962 and now has two sons.

—Co-Secretaries: **Bruce B. Bredehoff**, 16 Millbrook Road, Westwood, Mass. 02090; **T. Guy Spencer, Jr.**, M.I.T., Room E19-439, Cambridge, Mass. 02139

'57 CLASS REUNION June 9, 10, and 11

Next month is the gala occasion and, as promised, here are the what-to-wear hints for the ladies: in general the weekend

activities will be very informal. For Friday night slacks and sweaters will be just fine (remember, it can be quite cold in the Berkshires in June, especially at night!) or bermudas if we have a hot spell (bring both). If you feel like it, wear a mini-skirt (perhaps we'll give a prize to the girl with the shortest mini-skirt and the longest hair). But above all, casual. Saturday and Sunday activities will be very informal too. Again slacks and sweaters or bermudas and comfortable shoes. If you want to play tennis or golf, or go hiking, horseback riding or swimming, bring appropriate togs. Saturday night's party calls for simple cocktail dresses for the ladies (bring a wrap if you plan to step out-of-doors!) and coats and ties for the men. With a little judicious planning, it should all fit in a small suitcase. . . . If by chance you haven't registered for the weekend and now find that you can come after all, send a wire to Robert E. Hinman, Sales Manager, Jug End, South Egremont, Mass. 01258, requesting reservations. Be sure to indicate Class of 1957 Tenth Reunion. A wire to **Mal Jones**, M.I.T. room 53-383, or a telephone call (617-864-6900, ext. 6601) would also be appropriate so that your committee can use its good offices to assure your last minute reservations. See you next month.—**John A. Currie**, M.I.T., 77 Mass. Avenue, Cambridge, Mass.

Mal Jones and his wife Jill were our weekend guests here in London in February. Mal came to Europe to lecture on time sharing, an increasingly important subject in the field of computing. His itinerary included Bergen and Oslo in Norway and Gothenburg, Sweden. He recently completed his doctoral thesis and will receive his Ph.D. from Tech in June. He is planning to continue teaching and researching at M.I.T. for the immediate future. He briefed me on reunion plans, and they sound excellent. . . . **Milt Lilie**'s wife, Tish, enclosed a note with a response to a reunion mailing. It read in part as follows: "Milt is working for IBM in Yorktown Heights and running a small mail-order business on the side. He recently ran into Gideon Gartner, '56, at the IBM division in White Plains. We now have two children, Daniel age 7 and Jessica 3, and we are very proud of them. See you all in June." . . . Speaking of time sharing, and Milt Lilie, **Joe Carty** recently wrote, "I accepted a position in the time sharing division of IBM last summer. My wife and I are pleased to be near enough to attend the reunion after spending most of the last 6½ years in the West. We're looking forward to seeing old acquaintances and spending a few days away from the children, Jim 5, Tom 3, and Sara 2. Milt Lilie also works here at the Mohansic Lab." . . . Information received from **Alan Kotliar** who lives in Toronto informs us that he married the former Josephine Anne Reader in New York in September of last year. He has been a member of the Young Presidents Organization for the past three years and traveled with a group from that organization to Moscow and Berlin last year. . . . **Pete Richards'** interesting letter brought the following news: "I am currently associate professor of physics at the Univers-

sity of Kansas. Events since 1957 have included my marriage to Bette Wills in 1959 (we have two children, Gwen 6 and Alex 4); my receipt of a Ph.D. from Stanford in 1962; and the spending of three years abroad on post-doctoral research (one year at the University of Paris Pavia in Italy and two years at Oxford). We returned to the U.S. in the summer of 1964. I became assistant professor at Kansas and was promoted this year. Lawrence, Kan., is one of the few remaining small college towns and has a very forward-looking university. We like it very much."

. . . **Alvin Drake** recently passed along the following information: "My book, *Fundamentals of Applied Probability Theory*, will be published by McGraw on February 1. Liz, X '58, came back to school when we left Fort Monmouth in June 1964 and completed her Sc.D. at Tech in June of last year. She is now back at Arthur D. Little, Inc., designing moon probes, underground liquid gas tanks and space suit underwear. . . . **Dick Kain** is now associate professor of electrical engineering at the University of Minnesota.

. . . **Ed Friedman** will be coming to the reunion fresh from a few years in Afghanistan." . . . **Vivian Warren** sent the following note for this column: "Richard and I are living outside of New Haven in a contemporary house in the middle of the woods. We have four daughters ranging from 8 years to 10 months. We're looking forward to attending the reunion and seeing our friends." . . . **John Fredericks** recently sent me the information that he is president of Fredericks Fuel and Heating Service in Oak Ridge, N.J. John is married to the former Jane Dixon. They have two children, aged 8 and 6. . . . A letter from **Bill Brandon** brought the news that he has left Raytheon and now is with MITRE. He participated in the Alumni Fund drive in the Boston area. The local committee was headed by **Jim Cunningham**. **Allen Burgess** and **Joel Searcy** were also on the committee. Bill and Ann have four boys. . . . As they might say in England, that's all for two fortnights. Write if you get work.—**Frederick L. Morefield**, Secretary, 18 Whaddon House, William Mews, London SW1, England

'58

At the Foxboro Company the manager of the newly created department of development will be **Jim Graham**. Previously he was manager of analytical product design and also was supervisor of factory liaison engineers. Jim has continued to be active in local community affairs and is presently serving as financial secretary of the library building committee. . . . **Robert Oleksiak** has been named to the research staff of the Sperry Rand Research Center in Sudbury, Mass. He will be a member of the systems sciences department working on incremental computers. He was at the M.I.T. Instrumentation Lab for the past six years. Bob, his wife Melinda and two daughters, Sharon 3 and Marjory 8 months, are living in Carlisle. . . . **Harry Crouch** has been named assistant profes-

sor of physics at New College, Sarasota. After leaving M.I.T. Harry received his Ph.D. from Brown in physics and has held positions with the Brown physics department and at Oak Ridge Laboratory. He was a member of a multi-university, high-energy physics collaborative group utilizing bubble chambers for atomic particle investigations. . . . **Robert Spain** is now manager of the research department of the solid state electronics laboratory at Laboratory for Electronics in Boston. He recently received the doctorate in physics from the University of Paris after completing graduate studies there. Author of numerous papers on subjects relating to thin film phenomena in computers, his name will be in the new edition of *American Men of Science*. . . . Among those successfully passing the bar examination in Massachusetts was **John Fallon**. He graduated from the Western New England College School of Law. John has been senior engineer at Pratt and Whitney Aircraft in Hartford during this time. . . . At the U. S. Military Academy **William F. Reilly** was promoted to lieutenant colonel. Col. Reilly is an assistant professor in the department of physics and chemistry at the academy. He has received two awards of the Army, the Commendation Medal and the Bronze Star Medal. His wife Margaret is with him at West Point. . . . **Richard McCullough** is supervisor of the computer analysis group of the Underwater Systems Laboratory, Bell Telephone Laboratories in Whippany, N.J. He is presently working on his doctoral dissertation at Polytechnic Institute of Brooklyn. He has been with Bell Labs since 1960, following a two-year period as a teaching assistant at M.I.T. in 1958-1960. . . . **Daeyong Lee** has moved from the DSR staff at M.I.T. to join the research staff at General Electric's research and development center in Schenectady, N.Y. . . . **Charles Robbins** has been awarded another patent, this one for a light scanned tube which will provide highly improved signal to noise ratios for infrared detectors and X-ray image intensifiers. He is presently chief engineer, light amplifier tubes at Machlett Laboratories, a Raytheon subsidiary. . . . In the *IEEE Transaction on Magnetics* we found some news of class members. **Richard Hornreich** received an S.M. at Tech in electrical engineering and then joined LFE in Boston. . . . **Andrew Sass** went on to Purdue University where he received the M.S.E.E. and Ph.D. degrees in 1960 and 1962. Until 1964 he was an officer in the U. S. Army stationed at Lewis Research Center investigating various cryoelectric devices. Since 1964 he has been a member of the technical staff at the RCA Laboratories Research Center.



Charles
Robbins, '58

—Michael E. Brose, Secretary, 1171 North Street, Walpole, Mass.; Antonia D. Schuman, Western Associate, 22400 Napa Street, Canoga Park, Calif.

'60

Lois and **Ralph Buncher** reporting from San Francisco: "We are just passing through San Francisco on our way to Hiroshima, Japan, so I thought I'd drop a note to let you know what is new. I have finished my thesis at the Harvard School of Public Health, so one of these days Harvard will send me a document that proclaims me a doctor of science in biostatistics. We did not stay around for the cap and gown bit because my new job is starting immediately. I am working for the National Academy of Sciences as a biostatistician on their Atomic Bomb Casualty Commission. The work concerns the medical follow-up of the survivors of Hiroshima and Nagasaki. If any of the members of the class will be in Hiroshima in the next two years, please stop in and visit us. We had dinner last night with **Rick Greene** and his wife Pat; he is almost finished with his doctorate at Stanford. **Ralph Cuomo**, who is working in Wellesley, was supposed to be in town also on his honeymoon, but we missed him." . . . And still more mail, this time from **Charlie McCallum**: "My wife Lenda and I take great pleasure in announcing the birth of our first child, a daughter named Florence Andrea (to be called Andrea). I am still practicing law here in Grand Rapids, Mich., and have recently been honored by being asked to serve as regional chairman of the Alumni Fund solicitation program this year. I recently talked on the telephone with **Steven Scheinberg** who is now in his second year at Harvard Medical School after having obtained his Ph.D. in mathematics at Princeton and having taught for a couple of years." Thanks to both Ralph and Charlie for the mail. . . . News from the Southwest: **Farley Fisher** has been appointed assistant professor at Texas A & M; he received a Ph.D. from the University of Illinois and taught there for a time. He has been a post-doctoral research fellow at the California Institute of Technology before going to Texas A & M. . . . **John van Raalte** is with RCA Laboratories in Princeton, N.J.; he is currently in the display devices group where he has been conducting research on electrooptic materials and their applications to display and recording functions. He has been a member of the technical staff of the Systems Research Laboratory there since 1964. . . . Don't you feel guilty that you haven't written? Avoid that problem by sending news to—**Linda G. Sprague**, 345 Brookline Street, Cambridge, Mass. 02139

'61

It was bound to happen: "Greetings, will the real **Don Graham** please stand up! I read in the January Tech Review an in-

teresting report of my being at Stanford, etc. To my knowledge there is only one of me. In February 1966 I returned from a year and a half at the Indian Institute of Technology in Kanpur U.P. with an American program helping to get the school started. I was married to Natalie Herman in June and finally completed my Ph.D. thesis in electrical engineering in September at M.I.T. I am now at Sylvania's Applied Research Lab in Waltham, Mass., working on display systems. Who is the other guy?" Somebody in our class has a wife named Sherie and a daughter named Heather. Who is he? . . . **Don Straffin** signed his letter so I know it is authentic. "My wife Pat gave birth to another cute little girl, Kimberly Kay, on the 18th of January. It's probably some sort of a record to have three children born at Bethesda Naval Hospital in Maryland in one tour of duty: Donna Marie in '64, Teresa Leigh in '65 and now Kim in '67. I made Lieutenant, USNR, effective September 1 last year and have also received my final orders sending the Straffins home to Massachusetts on or about February 20. It's been a great tour of duty here in Washington. I really enjoyed it. There was time out for 6 months of schooling in Pittsburgh at the Bettis Atomic Power Lab and a number of shipyard and ship trips (sub, carrier and destroyer, all nuclear, of course). Plans for the immediate future include finding a home in the Worcester area and starting work again for State Mutual Life Assurance Company as an actuarial student." . . . **Gilbert Stegen** (Ron) wrote, "I finished my Ph.D. work at Stanford in January. My wife Barbara and I are in England for a year. I have a one-year appointment as visiting senior research fellow at the College of Aeronautics, Cranfield. Next year we will have to find some new adventure to embark upon. Eventually we hope to find a University which wants us. Oh well, one must dream." . . . Still in Europe is **Joe Harrington** who writes: "Just a line to say that Joseph Harrington IV arrived on the scene on January 5, our first child. Mother and son are doing fine. My job at Reaktorzentrum Seibersdorf continues to be interesting; I attended the international nuclear trade fair and conference NUCLEX 66 in Basle in September and got in a little travel before and after. We still plan on returning in 1968." . . . An envelope with a Vassar letterhead raised my wife's eyebrows but all was forgiven when I showed that it was from **Ken Blanchard**: "I would like to report the completion of my Ph.D. in organic chemistry at Princeton last month (January). I have been teaching chemistry at Vassar since September 1965 and married Rita Campbell (Vassar class of 1966, not coincidentally) in June of 1966." . . . **Ron Cornew** also felt moved by the muse and wrote: "I'll be receiving an Sc.D. in electrical engineering from M.I.T. this June and am getting a few things into journals, 'A Model of Adaptation in Amphibian Spindle Receptors' and 'Fine control in the Human Temperature Regulation System' in the *Journal of Biology*. I'm also teaching a course in computer programming at Simmons College in Boston which

turns out to be a bit of fun. I look forward to seeing any of you who may be passing through Boston. Drop by Long Warf."

George Harrison wrote that he has now completed recovery from an auto accident and works for Boeing at the Kent Space Center with Bob Moorhouse, '60. . . . **Jerry Milgram**'s sail loft in Sommerville, Mass., has been sold to Hard Sails, Islip, N.Y. For a short glorious period the firm of Milgram and Hopkins was a star of the sailing world. Jerry designed sails with the aid of a 7094 and they kept winning. His sails for the 5.5 meter class pretty much took over the world. They won a bronze medal in the 1964 olympics for Don McNamara (not of M.I.T.). Hard will continue making sails to Jerry's specification in their "Milgram Division." Jerry, meanwhile, remains at M.I.T. as a research associate in naval architecture. . . . The Tech Review clipping service has been most active in the last couple of months. Under the heading "Men of the World" 128 World states that **Curt Hartwig** was named senior research scientist for Raytheon's research division. Before that Curt was a research assistant at M.I.T. . . . The Baltimore News ran an item stating that **Akira Inadomi** designed the research, computer and instruction facilities of the three story science building at Japan International Christian U. near Tokyo. . . . The Troy Daily News has a remarkable editor. He heads articles with headlines like: "June Momentous Month for Trojan." The article goes on to say: "June has been a memorable month for Mr. and Mrs. David S. Wiley of Princeton, N.J. Wiley received his doctorate in theoretical physics, and the couple had their first child David Jr. with only a few days separating the two momentous events. His Ph.D. was from Princeton U. where he will remain for another year continuing his work in the Forrestal Research Laboratory." . . . The Belmont, Mass., papers had articles announcing **Ray Friescke**'s appointment as executive vice-president of the Building Research and Development Corporation. BRD is in Cambridge and specializes in the design of low cost housing and now designs houses for poverty areas in Appalachia. Ray was a nominee to the General Court (that's what they call the state legislature in Massachusetts) from Belmont and is vice-chairman of the Massachusetts Young Republicans. . . . The Waltham News-Tribune of November 16 said that **David Williams** got his doctorate in chemistry from the University of Florida and that he now works for General Precision Company in N.J. . . . Physics Today had an article mentioning that **Hale Bradt** was a member of a group that sent up a rocket-born experiment last March (1966) that "placed a very narrow bound on the extent of the celestial x-ray source in the constellation Scorpio and provoked a suggestion that it may represent a hitherto unseen class of objects, photostars."

Warren Wetmore writes that: "My present position is engineering editor, European office, of *Aviation Week*. My assignments have taken me to every Western European country except Finland and Portugal (which will be taken care of soon) and twice behind the Iron Curtain

to Warsaw for space conferences. I have also covered parts of Africa and the Middle East. Next year, 1967, I'm scheduled to be rotated back Stateside to our biggest and most important bureau, Washington." . . . There have been several press releases sent here by the Review Office and I present some representative samples. **Ted Hammack** "has joined the technical staff of the Shell Development Company, Emeryville, Calif., research center as an engineer in the materials engineering and corrosion department." . . . "Major **Alfred Molla**" was graduated from the U.S. Air Force Air Command and Staff College at Maxwell A.F.B., Ala., on June 10. The major has been assigned to the Air Weather Service staff, the Pentagon." . . . **Michael Kaplit** is now a faculty member at the University of Pennsylvania in Philadelphia. Mike got his M.S. and Ph.D. from Penn, the latter in 1965. He is an assistant professor of electrical engineering. . . . Last June **John Crissman** got his M.D. from Western Reserve in Cleveland. . . . **Frank Bachner** is now a first lt. with the Army. Last June he graduated from an ordnance officer course at Aberdeen Proving Grounds in Md. . . . **Sam Williamson** "is one of 15 outstanding young scientists who have been selected to participate during the next academic year in the postdoctoral research program supported by the Air Force Office of Scientific Research." Sam will work in France at the University of Paris in solid state physics. His specialty is in microwave absorption of superconductors. . . . Last June **Milton Clouser** got his Ph.D. from Lee DuBridge at Cal Tech. . . . **Jim Knoedler** is the head of the mission analysis section in the guidance and analysis department of TRW Systems in Houston. . . . **Arthur Chen** is in Schenectady working for General Electric. He is in their research and development center as an electrical engineer in the information services laboratory. Arthur got his Ph.D. from M.I.T. last year. . . . Well that pretty much clears off my desk, and I trust that it was all true. Please address all corrections to—**Andrew Braun**, Secretary, 131 Freeman Street, Brookline, Mass. 02146

'62 CLASS REUNION

June 9, 10, and 11

William Bray is with Graves, Cougherty, Gee, Hearon, Moody and Garwood in Austin, Texas. . . . **Ernest Kendall** is in the geology department at the University of California in Berkeley. . . . **Malcolm McMillan** is with White, Weld & Company in New York City. . . . **Michael H. Reid** is in the electrical engineering department of the University of Rochester in New York. . . . **Harold Waller** is in the department of government at Georgetown University in Washington, D.C. . . . **Kenneth Wang** is working for Burlington Industries in Greensboro, N.C. . . . Lt. **Neil Weatherbie** is now stationed at Keesler Air Force Base in Mississippi. . . . **George T. Weiner** is at Lake Forest College in Lake Forest, Ill. . . . Dr. **Warren Zapol** is in Harvard Surgical Service at Boston City Hospital. . . . **Francis**

Maher, Jr., is with Chevron Oil Company in Houston, Texas. . . . **Winn F. Martin** is with Arthur Young & Company in New York City. . . . **Stuart A. Nelson** is in the mathematics department at Iowa State University at Ames. . . . **Einar B. Qvale** is teaching in the School of Mechanical Engineering at Purdue University in Lafayette, Ind. . . . **Willard Rodgers, Jr.** is at Pahlavi University in Shiraz, Iran. . . . **John (Bear) Rothschild** is working for an ad agency in New York City and was recently married. He'll have to write to me to get a more complete story printed. . . . **Firouz Vakil** is in Berkeley, probably at the University of California. . . . **Charles Whitman** who has worked on guidance systems for the Titan space capsule and the Apollo moonship at TRW in Boston was recently transferred to Los Angeles. He and his wife were featured in an article in *Commercial News* about their move to California utilizing a new "full-circle service" system provided by Smyth the smoother movers (or swifter lifters). . . . Navy Ensign **Leonard Castelluccio** was commissioned an officer in the U.S. Navy following his graduation from the 16-week Officers' Candidate School at the Naval Base in Newport, R.I. He will report to the USS *Holder* in Norfolk, Va. . . . **Bill Levine**, VI, co-authored an article entitled "On the Optimal Error Regulation of a String of Moving Vehicles" which was printed in the July 1966 issue of the *IEEE Transactions*. . . . **John Buta** received an M.S. in mechanical engineering in January from the University of Akron. . . . **Francis W. Kaseta** was promoted from assistant professor to associate professor at the College of the Holy Cross in Worcester, Mass. He is in the physics department, and his interests lie in solid state physics and electrical and optical properties of solids and cryogenics. He is married and the father of two daughters. . . . **Robert Gladstone** worked in conjunction with Professor Frederick J. McGarry at M.I.T. on the use of lasers to weaken rock in tunneling research. . . . **Martin Poppe** worked for Electronic Communications, Inc., in St. Petersburg, Fla., from 1963 to 1966 on a study involving the closed loop dynamics of a digital frequency synthesizer, on satellite communications system modulator-demodulator design, and on studies related to feedback demodulation systems for space communication applications, including both FMFB and phase-locked techniques. He also taught at the University of Florida's graduate school in Gainesville and at the St. Petersburg Junior College. Currently he is an instructor in the department of electrical sciences of the State University of New York at Stony Brook where he is continuing his studies. He received his M.S. from Stanford University in electrical engineering in 1963. . . . **Paul M. Munafo** is attending graduate school in mechanical engineering at Tulane University in New Orleans, La. He is a stress engineer at the Boeing Company. . . . Speaking of Boeing, my wife and daughter and I are now living in the land of Boeing in Seattle, Wash. I have left Oceanic Properties to become general manager of Nellum In-

vestment Company, a brand new land development subsidiary of S. S. Mullen, Inc., a heavy construction company doing business in five states and overseas. Nellum will concentrate on industrial and commercial development and investment in the Seattle area, which is currently booming. My office will be in downtown Seattle, and the first project will be an industrial development on a 10-acre parcel in south Seattle with water, rail, and highway access. We are renting a house in Bellevue, a suburb east of Seattle, while a subdivision house we have purchased is under construction. It will be completed in June just about reunion time, but we hope to settle all attendant problems and see you all at the White Cliffs anyway.—**Jerry Katell**, Secretary, 15225 N.E. 6th Place, Bellevue, Wash. 98004

'63

David Caldwell is now in the Signal Corps, U.S. Army. He just finished a 23-week course at Ft. Gordon, Ga. . . . **Michael Lintner** received his Ph.D. in chemistry from the University of Illinois and is now in plastics R&D at DuPont in Wilmington. . . . **Michael Schaffer** is now in the Peace Corps in Chile. . . . **Arthur Connolly** is at Lockheed-California in Burbank where he has been for almost two years. . . . **Stephen Spock** is with the Link-Belt Company in Indianapolis. He was married last January 14 and is now finishing his M.S. in metallurgical engineering at Purdue. . . . **Fred Delse** is in his fourth year of a joint M.D.-Ph.D. program at Duke. His specialty is physiological psychology, and he is a fellow of the National Institute of Mental Health. . . . **Al Rogol** is in a similar program at Duke, his area is physiology and he is a fellow of the National Cancer Institute. . . . **Steve Rudnick** corrects a recent error made in this column: rather than helping Northeastern University develop some courses, he is actually on the faculty there. He is also married to the former Lois Palken, Jackson College '66, now at Tufts Grad school. If you have any additions, deletions, or corrections, send them to:—**Bob Johnson**, Kidder, Peabody & Company, 20 Exchange Place, N.Y., N.Y. 10005

'64

The amount of news coming in has hit a new low this month despite two more

Mike Schaffer and David Caldwell, '63



class heroes, **Ted Cruise** and **David Evans**, who both sent in letters. By the time this issue reaches you, the deadline for the last issue this season (May 15) will have probably passed. But any news sent to me before that date will be put in the July issue of the Review. Ted Cruise is engaged to Sherry Ormsby of Rockwall, Texas. Sherry is a high school teacher and a graduate of two Texas universities. After a July wedding they will return to M.I.T. where Ted is working on his Ph.D. . . . David Evans not only sent a letter, but is the last known contributor to the class treasury, resulting from our appeal for funds that originally went out two years ago. David was married in June of 1965 to the former Betsy Newcomb of North Haven, Conn., a graduate of Lesley College. Betsy is teaching in Arlington, but will retire at the end of this school year to have their first child in September. David received his M.S. in electrical engineering at M.I.T. in February 1966 and is continuing on for his Ph.D. . . . **M. A. Kovacs** was co-author of an article concerning Q-switching techniques in gas lasers in the September 1966 issue of the *IEEE Journal of Quantum Electronics*. . . . **Bob Sanders** was married last December to the former Miss Sara-Ann Legow. Sara-Ann is currently a law student at Boston University while Bob is an applied research engineer with Sylvania in Waltham. Bob received his M.S. in electrical engineering from the University of Penn. . . . **Michael Stulberg** is engaged to Miss Barbara Greil Kriegsman of Atherton, Calif. Barbara is presently attending Palo Alto Secretarial School while Michael is at Harvard Medical School and holds a research fellowship at Beth Israel Hospital. A spring wedding is planned. . . . Let me hear from you.—**Ron Gilligan**, 202A Holden Green, Cambridge, Mass. 02138

'65

Chan Stowell and Miss Margaret Cross are engaged with an August wedding planned. In June Chan will get his masters degree from the Sloan School and Margaret will graduate from Wellesley. . . . **Dick Arold** and his wife have moved to Washington, D.C., where Dick is working for W. R. Grace. . . . **Larry Stark** is finishing his masters at Cornell and will go on for a Ph.D. in electrical engineering. He also reports that **Owen Blake** is in Baltimore working for DuPont. . . . **Bill Brody** is still soaking up the sun at Stanford Med School and in his spare time is sending out personal notes reeking with bad puns to all non-contributors to the Alumni Fund. Be forewarned!!! . . . **Jim Steele** finished up a Mediterranean tour of duty and is now spending the last six months of his commitment at the Portsmouth Naval Shipyard in New Hampshire. He and his wife Linda have just had their first child, a little girl named Lorra Ann. . . . **Ralph Cicerone** was married over the Christmas holidays and is now working towards his doctorate in electrical engineering at the University

of Illinois. . . . The **Phil Strause** family just had their first child, a little boy named Gordon Maurice. . . . **Cash Peacock** is finishing up his Army duty at their Brooklyn computing center. . . . **Roddy McLeod** will be spending the summer in London working for Celanese. . . . **Bruce Fauman** is working for General Foods in Toronto. . . . **Billy Cohen** is finishing up his masters work at the Sloan School and will be going into the Navy after that. . . . **Jeff Meldman** is at Harvard Law School and has produced and directed the Law School play this year. . . . **Jay Rogers** is getting married to his University of Florida gal, Chris Green, in Ft. Lauderdale on June 17. Jay will be in Los Angeles working on a Ph.D. in physics. . . . **Don Fredrickson** has finished up at the University of Munich and is now studying at Grenoble. . . . **Jim Piepmeyer** has been at Churchill College, Cambridge, for the past two years on a Marshall Scholarship and is currently captain of the rowing club which involves coaching four eights as well as rowing in the first shell himself. . . . **Jerry Wilcox** married the former Miss Linda Freeman. Jerry will get his masters from the Sloan School in June which will be the time that Linda graduates from Boston University. . . . Finally, yours truly is engaged to Miss Janet Razler who graduated from Simmons in '65, and we will be getting married in September.—**Jim Wolf**, Secretary, McCulloch C-41, Harvard Business School, Soldiers Field Road, Boston, Mass. 02163

Graduate Students

V

Chemical and Engineering News reported the following three items in the February 27 issue: **Charles R. Milone**, Ph.D. '36, was named to the newly created position as director of general product development for Goodyear Tire and Rubber Company, Akron, Ohio. **Joseph Iannicelli**, Ph.D. '51, was promoted to research manager of the clay division at J. M. Huber Company, Huber, Ga. **Lester Corrin**, Ph.D. '48, returns to State University College, Paltz, N.Y., after a term at the University of Rochester as visiting associate professor. . . . **H. Paul Julien** has been appointed manager of advanced technology and testing of Jim Walker Research Corporation. He will join the company's research staff in Des Plaines, Ill., until the operations are moved later this year to St. Petersburg, Fla. Paul entered M.I.T. from DePauw University in 1951,



H. Paul Julien,
V Ph.D '55

was awarded the doctorate in physical chemistry with minors in mathematics and physics in 1955. From 1955 to 1959 he was a group leader on a variety of basic research problems with Esso Research and Engineering Company, and prior to joining the J. M. Walter Research Corporation he was manager of ceramic and metallurgy research for the Carborundum Company and directed product development for one of the divisions in bonded abrasives. . . . A feature writer, Ted Ashby, in the Boston *Globe*, November 16, 1966, had a long article as the result of an interview with Professor **Paul H. Doleman** of Tufts College. Professor Doleman graduated from English High School in 1920, Tufts College in 1924 and was awarded the doctorate in organic chemistry from M.I.T. in 1931. "Doc" is a bachelor living on Ravine Road, Stoneham. According to the article he still plays squash and tennis, attends the Patriots' and Bruins' games, the Boston Symphony and still has a remarkable sense of humor. As a professor of organic chemistry he has been particularly active in preparing students for a career in medicine and dentistry. . . . As evidence that the study of chemistry with a background in mathematics and physics and some extracurricula activities on the side may lead to a responsible position in an entirely different field, we note that Carl Lindeman, Jr., Class of 1944 with an S.B. in chemistry, is vice-president of NBC sports—which has as sports commentators Curt Gowdy and Paul Christman.

The Trinity College News Bureau reports that **James K. Heeren** has been advanced to the rank of associate professor of chemistry effective September 1, 1967. He joined the staff at Trinity as an assistant professor in 1962. Jim was a native of Fitchburg, Mass., graduated from Cushing Academy, Ashburnham, received the B.S. and M.S. degrees in chemistry from Tufts College and from 1954-1956 was employed as a research chemist by the American Cyanamid Company in Stamford, Conn. He entered M.I.T. in the fall of 1956 and was awarded the doctorate in 1960. Jim returned to the American Cyanamid Company, then back to M.I.T. as a postdoctoral fellow where he studied for one year with Professor Sheehan. Many recent graduates will remember Carole, his wife, as a very efficient departmental secretary. They now live at 93 Valley View Drive, Weathersfield, Conn. A personal note from the Heerons received a month or two ago announced the adoption of a baby daughter. . . . **Ronald P. Black** joined Analytic Services, Inc., Falls Church, Va., in August 1964. He received the B.S. degree in chemistry with a minor in mathematics from Millsaps College 1958, attended Tulane University for special courses in chemical thermodynamics, and was awarded the doctorate in nuclear chemistry with a minor in mathematics M.I.T. 1964. His principal work has been studies in the area wherein scientific and technological factors interact with federal policy considerations. . . . **John P. Fackler** wrote in January that he has been an associate professor of chemistry at the Case Institute of Technology, Cleveland, Ohio,

since 1962. John entered M.I.T. as a candidate for the doctorate in chemistry in 1956 with an undergraduate degree from Valparaiso University, Ind. He was awarded the doctorate in 1960 and was an assistant professor at the University of California, Berkeley, for two years. John worked with Dr Cotton. Attached to his letter was a list of 19 scientific publications in the field of inorganic chemistry. . . . Many of us who knew **Ralph Swann**, Ph.D. 1941, were shocked to learn of his death in early January. Dr. Swann was 54. He received his B.S. degree in chemistry at Morris Harvey College in 1932 and at the time of his death was head of the Department of Chemistry at North Carolina State University and had served in that capacity for six years. Prior to his appointment at N.C.S.U. he spent eight years in the research and development of rockets and guided missiles at the Redstone Arsenal, Huntsville, Ala., and prior to his association with the Redstone Arsenal he was engaged in research with industrial companies in New York, West Virginia and Chicago as a research director. Of the older staff members in chemistry Dr. Ashdown knew him best as Avery served as Ralph's thesis advisor.—**L. F. Hamilton**, Correspondent, M.I.T. Room 4-258, Cambridge, Mass. 02139

XV

The Sloan School's Graduate Alumni Association was launched with appropriate fanfare on March 17 at a meeting of its New England and Upstate New York members on the M.I.T. campus. Nearly 50 members and more than 25 of their wives attended. Arthur P. Alexander, '58, presided as GAA president, and registrants at the meeting included the other GAA officers (Robert M. Briber, '52, vice-president; Richard J. Wollensak, '58, treasurer; Howard F. Miller, '63, secretary; Samuel Appleton, '57, editor; and Bernard Kupferschmidt, '56, and Charles F. Langen-

Preparing for the GAA: Howard W. Johnson, President of M.I.T. (right), poses on the steps of the Sloan Building with William F. Pounds (left), Dean of the Sloan School of Management, and Arthur P. Alexander, '58, president of the Sloan School's new Graduate Alumni Association.

hagen, '58, directors) and at least 12 members of the Sloan School faculty.

Howard W. Johnson, President of M.I.T., opened the afternoon session, describing the history of the Sloan School as a product of three concurrent streams: M.I.T.'s traditional role in relation to American industry; the experience and quality of the School's leadership (including the late Alfred P. Sloan, Jr., '95, the late Erwin H. Schell, '12, and E. P. Brooks, '17); and the environment at the Institute, which has made "the use of powerful new management tools a core around which to build a new kind of business school."

The Sloan School must continue to be a dynamic force in management education, said President Johnson, and it can accomplish this through the stimulation of a high quality student body and through the positive force of its alumni.

In special afternoon study groups the GAA alumni reviewed their educational experience at the Sloan School in view of their subsequent experience, and they came together at the end of the afternoon to summarize their findings: the graduate program, they said, had succeeded in expanding the scope of their thinking, had provided appropriate technical competence, and had given them a conceptual framework for understanding the problems and goals of modern management. If the program had shortcomings it was in preparation for such psychological hazards as the essential loneliness of the manager's decision-making function and the frustrations of his daily work; and in an understanding of the fact that not all business problems need to be solved, that problem-identification is often as difficult as problem-solving.

During the afternoon Mrs. Douglas M. MacGregor led a discussion with the wives on "The Multiple Role of the Executive Wife," and later the group was entertained at tea by Mrs. Howard W. Johnson in the President's House.

William F. Pounds, Dean of the Sloan School, made his after-dinner keynote address a closely reasoned analysis of what

Chairman, Places, and Dates for M.I.T. Class Reunions This Spring

- 1907: Secretary: Philip B. Walker, 18 Summit St., Whitinsville, Mass.; M.I.T. Campus, June 9-11.
- 1912: Reunion Chairman: Albion R. Davis, 38 Sabrina Rd., Wellesley, Mass.; M.I.T. Campus, June 9-11.
- 1915: Secretary: Azel W. Mack, 100 Memorial Drive Apt. 2-6A, Cambridge, Mass., Class Cocktail Party, M.I.T. Faculty Club, 4:00 P.M., June 12.
- 1917: *50th Reunion.* Reunion Chairman: John A. Lunn, 37 Larch Rd., Cambridge, Mass.; Chatham Bars Inn, Chatham, Mass., June 9-11.
- 1922: Reunion Chairman: Parke D. Appel, 32 Old Farm Rd., Dover, Mass.; Wianno Club, Osterville, Mass. June 9-11.
- 1927: *40th Reunion.* Reunion Chairmen: J. Robert Bonnar, 16 Morgan Place, White Plains, N.Y.; Glenn D. Jackson, Jr., Teheran; Bald Peak Colony Club, Melvin Village, N.H. June 9-11.
- 1932: Reunion Chairman: Elwood W. Schafer, Room 13-2145, M.I.T., Cambridge, Mass.; New Ocean House, Swampscott, Mass., June 9-11.
- 1937: Reunion Chairman: G. Richard Young, 3 Falmouth Rd., Wellesley Hills, Mass.; Oyster Harbors Club, Osterville, Mass.; June 9-11.
- 1942: *25th Reunion.* Reunion Chairman: Robert H. Rines, Rines & Rines, 10 Post Office Square, Boston, Mass.; M.I.T. Campus, June 9-11.
- 1947: Reunion Chairman: Alexis Pastuhov, Tahanto Farm Rd., Harvard, Mass.; New England Inn, Intervale, N. H., June 9-11.
- 1952: Reunion Chairman: Douglas F. G. Haven, 29 Martin Rd., Wellesley, Mass.; Wychmere Harbor Club, Harwichport, Mass., June 9-11.
- 1957: Reunion Chairman: Malcolm M. Jones, Suite 317, 101 Monmouth St., Brookline, Mass.; Jug End, South Egremont, Mass., June 9-11.
- 1962: Reunion Chairman: Edward H. Linde, 84 Briar Lane, Westwood, Mass.; White Cliffs, Plymouth, Mass., June 9-11.



will determine the success or failure of the GAA. He noted that no one wants to add more meetings to his calendar just for the sake of meetings; the GAA will have to compete with other programs for its members' support, and it will have to compete with other opportunities at the Sloan School for its support among the faculty. But his prognosis was optimistic because, he said, the mutual needs of the alumni and the school will produce the viable base for an organization.

Fred G. Lehmann, '51, Secretary of the M.I.T. Alumni Association, who attended the meeting, commented afterwards that many GAA members "seemed to be discovering that 'your business problems are really very similar to mine after all.'

Obviously, people were finding common ground, and that is the essence of what will make this organization grow."

Club News

Alumni Council:

The Presidents' Night

It was "The Presidents' Night" at the March meeting of the Alumni Council, and nine former presidents of the Alumni Association paid tribute to Howard W. Johnson on his first appearance as M.I.T.'s President before the Council.

The alumni presidents included Horatio L. Bond, '23, C. George Dandrow, '22, Alfred T. Glassett, '20, Samuel A. Groves, '34, John A. Lunn, '17, Theodore T. Miller, '22, Harold B. Richmond, '14, Donald G. Robbins, '07, and D. Reid Weedon, Jr., '41.

President Johnson, who began his speech with a nostalgic remark about the relatively simple duties of a *past* president, discussed several aspects of M.I.T.'s effort to meet the continuously changing demands of modern technology.

In order to try to understand where these changes are leading the Institute, President Johnson said, he has asked all deans and laboratory directors, and through them all heads of departments, to undertake 10-year projections to indicate the new fields they think should by then be represented at M.I.T., the students, the space, and the money which will be involved in their activities in 1975. These forecasts of changes, he said, will be the input to the planning process which will assure the Institute's effective development.

American universities will increasingly be at the crest of change, President Johnson told the Council, and especially M.I.T. will find itself constantly "at the frontier of knowledge." As an example, President Johnson noted that "half of the subjects now being taught at M.I.T. were not in existence 10 years ago."

President Johnson listed three special concerns of the Institute today: to improve the quality of the student environment; to better understand the problems of undergraduate, graduate, and post-doctoral education in order to assure its continuing effectiveness; and how to contribute M.I.T.'s fair share in meeting "the awakened concern of educated people of all ages for keeping up with the changing world." The faculty Committee on Lifetime Learning promises to have some important observations on the latter problem, he said, and he cited alumni club seminars, regional conferences, and the annual Alumni Seminar as significant experiments in this field.

There are also, he said, very important problems in the area of undergraduate education. M.I.T. has three objectives for its undergraduates: mastery of technical information, so that a student is able to use concepts that were not his before ("knowledge in depth has always been the mark of an M.I.T. man"); ability

to judge, to discriminate, "to deal with ambiguity, the standard condition of our time"; and personal responsibility to society ("their greatest source of pride should be the knowledge that something has been made to happen").

In achieving these ends, M.I.T. is confronted with problems which are "at the heart of our planning process." How can the academic program be most effectively structured? How can it be related to effective performance on the job? What are the factors that lead students to select M.I.T.?

One of M.I.T.'s responses to these challenges, he said, has been the increasing flexibility of its undergraduate programs, and the most significant factor behind this trend is "the change in the type of student coming to M.I.T." Our freshmen are now better prepared "in terms of maturity as well as intellect," he declared, and in general they are increasingly ready for early responsibility. The growing ferment on college campuses—including M.I.T.'s—is a manifestation of the students' increasing readiness for growth, President Johnson said, "and I for one welcome it."

M.I.T. Club of Rhode Island:

Expansion Planned; Officers Elected

At a recent meeting plans were formulated for expanding the activities of the club in this area. At present only tentative arrangements have been worked out for two dinner meetings in the spring and the possibility of a picnic in the early fall. All meetings are open to wives and guests. We are also attempting to determine if there is sufficient interest in the area alumni to establish a luncheon club on a monthly basis. If any alumni in the Providence area have not been contacted and are interested, it would be appreciated if the Secretary is notified at the address below.

Officers elected for the year are Eli A. Grossman, '36, President; Peter Quattrochi, '44, Vice-President; Stewart A. Phillips, '32, Secretary-Treasurer.—S. A. Phillips, P.O. Box 326, Warwick, R.I. 02887

M.I.T. Club of Buenos Aires:

All M.I.T. Travelers Welcome

Last year we celebrated the 25th anniversary of the founding of our club in Buenos Aires, and we felt a bit lonely. Our club is a small one, with a roster of slightly over 50 members, but we are good friends and, as is usually the case with M.I.T. graduates, most of our members hold important positions in business and industry.

Should any M.I.T. Alumni come to Buenos Aires, we would be very pleased to give them every assistance possible within our means. We hold some nine dinner reunions throughout the year, and during 1967 they will take place on the following dates: May 11, June 1, July 6, August 3, September 7, October 5, November 2, and December 7—in other words, the first Thursday of each month except May. Any visiting M.I.T. graduate will be very welcome at these reunions.

For the convenience of M.I.T. travelers to Buenos Aires I list below the names and telephones: President, Admiral An-

tonio Marin, '38, tel. 42-8309; Vice-president, Eng. Amilcar J. Romeo, '56, tel. 83-5464; Secretary-treasurer, Guy de Poligny, '60, tel. 771-3383.—Guy de Poligny, Secretary-Treasurer, Casilla de Correo No. 3492, Correo Central, Buenos Aires, Argentina

Club Calendar

COLUMBUS, OHIO—Dinner meeting, May 1: E. Neal Hartley, Professor of History, M.I.T.

ST. LOUIS—Dinner meeting, May 2: Dayton E. Carritt, Professor of Chemical Oceanography, M.I.T.

BRIDGEPORT, CONN.—Dinner meeting (the Clam Box Restaurant, Westport), May 3: Robert C. Casselman, '39, Senior Lecturer in Management, M.I.T.

MANCHESTER, N.H.—Dinner meeting, May 3: Paul E. Gray, '54, Associate Professor of Electrical Engineering, M.I.T., and Alan J. Lazarus, '53, Assistant Professor of Physics, M.I.T.

NEW YORK CITY—Buffet dinner and lecture (Harvard Club of New York City), May 3: Francis Keppel, Chairman of the Board, General Learning Corporation

BETHLEHEM, PA.—Dinner meeting (Hotel Bethlehem), May 4: Nathaniel H. Frank, '23, Professor of Physics

HARRISBURG, PA.—Dinner meeting May 4: Richard R. Randlett, Assistant Registrar, M.I.T.

NEW YORK CITY—Computer seminar (Carnegie International Center), May 9: The Computer in Manufacturing Industries

SAN DIEGO—Annual meeting, May 10: M.I.T. movie, "In This Decade"

BOSTON—Luncheon annual meeting (Union Oyster House), May 11

ATLANTA—Meeting, May 11: Laurence R. Young, '57, Assistant Professor of Aeronautics and Astronautics, and Robert J. Hansen, '48, Professor of Civil Engineering, M.I.T.

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PHILADELPHIA—M.I.T. Regional Conference, March 9, 1968

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Obviously, people were finding common ground, and that is the essence of what will make this organization grow."

Club News

Alumni Council: The Presidents' Night

It was "The Presidents' Night" at the March meeting of the Alumni Council, and nine former presidents of the Alumni Association paid tribute to Howard W. Johnson on his first appearance as M.I.T.'s President before the Council.

The alumni presidents included Horatio L. Bond, '23, C. George Dandrow, '22, Alfred T. Glassett, '20, Samuel A. Groves, '34, John A. Lunn, '17, Theodore T. Miller, '22, Harold B. Richmond, '14, Donald G. Robbins, '07, and D. Reid Weedon, Jr., '41.

President Johnson, who began his speech with a nostalgic remark about the relatively simple duties of a *past* president, discussed several aspects of M.I.T.'s effort to meet the continuously changing demands of modern technology.

In order to try to understand where these changes are leading the Institute, President Johnson said, he has asked all deans and laboratory directors, and through them all heads of departments, to undertake 10-year projections to indicate the new fields they think should by then be represented at M.I.T., the students, the space, and the money which will be involved in their activities in 1975. These forecasts of changes, he said, will be the input to the planning process which will assure the Institute's effective development.

American universities will increasingly be at the crest of change, President Johnson told the Council, and especially M.I.T. will find itself constantly "at the frontier of knowledge." As an example, President Johnson noted that "half of the subjects now being taught at M.I.T. were not in existence 10 years ago."

President Johnson listed three special concerns of the Institute today: to improve the quality of the student environment; to better understand the problems of undergraduate, graduate, and post-doctoral education in order to assure its continuing effectiveness; and how to contribute M.I.T.'s fair share in meeting "the awakened concern of educated people of all ages for keeping up with the changing world." The faculty Committee on Lifetime Learning promises to have some important observations on the latter problem, he said, and he cited alumni club seminars, regional conferences, and the annual Alumni Seminar as significant experiments in this field.

There are also, he said, very important problems in the area of undergraduate education. M.I.T. has three objectives for its undergraduates: mastery of technical information, so that a student is able to use concepts that were not his before ("knowledge in depth has always been the mark of an M.I.T. man"); ability

to judge, to discriminate, "to deal with ambiguity, the standard condition of our time"; and personal responsibility to society ("their greatest source of pride should be the knowledge that something has been made to happen").

In achieving these ends, M.I.T. is confronted with problems which are "at the heart of our planning process." How can the academic program be most effectively structured? How can it be related to effective performance on the job? What are the factors that lead students to select M.I.T.?

One of M.I.T.'s responses to these challenges, he said, has been the increasing flexibility of its undergraduate programs, and the most significant factor behind this trend is "the change in the type of student coming to M.I.T." Our freshmen are now better prepared "in terms of maturity as well as intellect," he declared, and in general they are increasingly ready for early responsibility. The growing ferment on college campuses—including M.I.T.'s—is a manifestation of the students' increasing readiness for growth, President Johnson said, "and I for one welcome it."

M.I.T. Club of Rhode Island: Expansion Planned; Officers Elected

At a recent meeting plans were formulated for expanding the activities of the club in this area. At present only tentative arrangements have been worked out for two dinner meetings in the spring and the possibility of a picnic in the early fall. All meetings are open to wives and guests. We are also attempting to determine if there is sufficient interest in the area alumni to establish a luncheon club on a monthly basis. If any alumni in the Providence area have not been contacted and are interested, it would be appreciated if the Secretary is notified at the address below.

Officers elected for the year are Eli A. Grossman, '36, President; Peter Quattrocchi, '44, Vice-President; Stewart A. Phillips, '32, Secretary-Treasurer.—S. A. Phillips, P.O. Box 326, Warwick, R.I. 02887

M.I.T. Club of Buenos Aires:

All M.I.T. Travelers Welcome

Last year we celebrated the 25th anniversary of the founding of our club in Buenos Aires, and we felt a bit lonely. Our club is a small one, with a roster of slightly over 50 members, but we are good friends and, as is usually the case with M.I.T. graduates, most of our members hold important positions in business and industry.

Should any M.I.T. Alumni come to Buenos Aires, we would be very pleased to give them every assistance possible within our means. We hold some nine dinner reunions throughout the year, and during 1967 they will take place on the following dates: May 11, June 1, July 6, August 3, September 7, October 5, November 2, and December 7—in other words, the first Thursday of each month except May. Any visiting M.I.T. graduate will be very welcome at these reunions.

For the convenience of M.I.T. travelers to Buenos Aires I list below the names and telephones: President, Admiral An-

tonio Marin, '38, tel. 42-8309; Vice-president, Eng. Amilcar J. Romeo, '56, tel. 83-5464; Secretary-treasurer, Guy de Poligny, '60, tel. 771-3383.—Guy de Poligny, Secretary-Treasurer, Casilla de Correo No. 3492, Correo Central, Buenos Aires, Argentina

Club Calendar

COLUMBUS, OHIO—Dinner meeting, May 1: E. Neal Hartley, Professor of History, M.I.T.

ST. LOUIS—Dinner meeting, May 2: Dayton E. Carritt, Professor of Chemical Oceanography, M.I.T.

BRIDGEPORT, CONN.—Dinner meeting (the Clam Box Restaurant, Westport), May 3: Robert C. Casselman, '39, Senior Lecturer in Management, M.I.T.

MANCHESTER, N.H.—Dinner meeting, May 3: Paul E. Gray, '54, Associate Professor of Electrical Engineering, M.I.T., and Alan J. Lazarus, '53, Assistant Professor of Physics, M.I.T.

NEW YORK CITY—Buffet dinner and lecture (Harvard Club of New York City), May 3: Francis Keppel, Chairman of the Board, General Learning Corporation

BETHLEHEM, PA.—Dinner meeting (Hotel Bethlehem), May 4: Nathaniel H. Frank, '23, Professor of Physics

HARRISBURG, PA.—Dinner meeting May 4: Richard R. Randlett, Assistant Registrar, M.I.T.

NEW YORK CITY—Computer seminar (Carnegie International Center), May 9: The Computer in Manufacturing Industries

SAN DIEGO—Annual meeting, May 10: M.I.T. movie, "In This Decade"

BOSTON—Luncheon annual meeting (Union Oyster House), May 11

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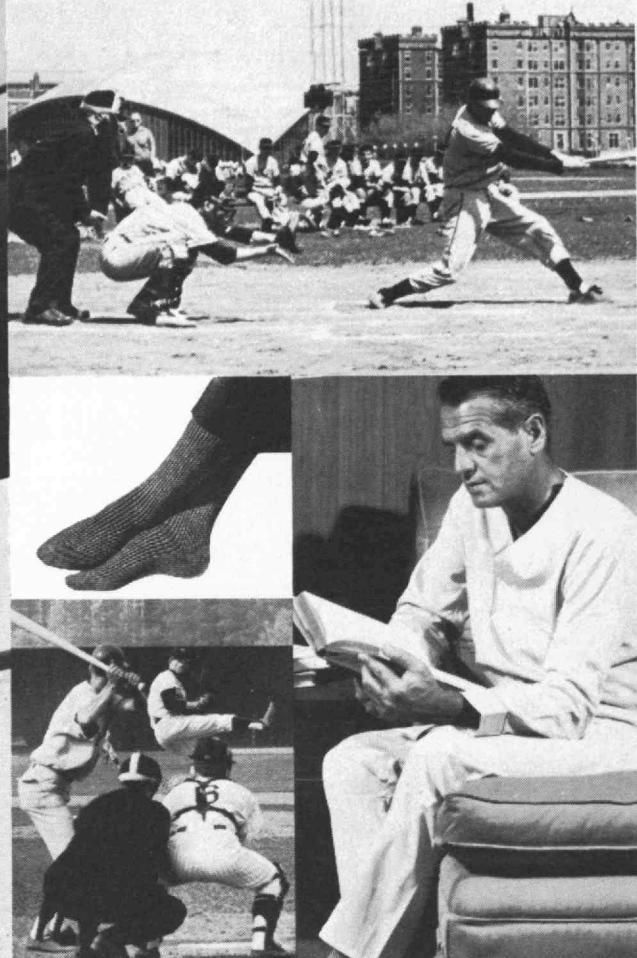
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MEN ON THE MOVE... INTENT ON WHERE THEY'RE GOING

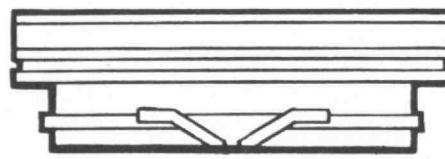
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Sweep and Marker Generator for use with GR Synthesizers. It has nine sweep speeds, from 0.02 to 60 seconds, and sweep excursion is adjustable from $\pm .001$ Hz to ± 1 MHz. Generates scope markers for quick calibration of the swept output. The synthesized center-frequency marker and side markers are accurate, stable, and precisely settable. Type 1160-P2 Sweep and Marker Generator . . . \$495.,

General-Purpose Laboratory Oscillator with its full 10-Hz to 50-kHz range covered by one turn of the dial. No range switch to wear out! This also means no range-switching transients and no ambiguous dial multipliers. Generates both sine and square waves, and can be synchronized to an external signal or can supply a sync signal. Has a calibrated 60-dB step attenuator and a 20-dB continuously adjustable attenuator. Type 1313-A Oscillator . . . \$325.

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Precision Decade Transformer with 0.2 PPM linearity and easily repeatable settings to 1×10^{-9} . Lever switches for easy, in-line readout plus infinite-resolution slide wire (that can be switched out of circuit for calibration). Type 1493 Precision Decade Transformer . . . \$1100.

Other new products include the Type 1406 Coaxial Capacitance Standards and several additions to the GR874 and GR900 lines of coaxial equipment.

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